NINJA

(SERVICE MANUAL)

Issue No. AA
& Date GEN / 28 / 2004

SPECIFICATIONS

GENERAL

Transmitter..Crystal controlled PLL synthesizer, AM,FM
Receiver................................ Crystal controlled double conversion, supperheterodyne system
Communication frequencies...............................40 CB channel (26.965 to 27.405 MHz) for EU
40 CB channel (27.60125 to 27.99125 MHz) for UK
80 CB channel (26.565 to 27.405 MHz) for Germany
Voltage operation...12 ~ 16 V DC (negative ground)
Transmitter/Receiver switching...Electrical

STANDARDS TEST CONDITIONS

Battery supply voltage...13.8 V DC
Modulation FM..1.0 KHz / 1.2 KHz deviation
Receiver output power...2 W at external SP
Receiver output impedance:...8 ohms resistive
Antenna load impedance of transmitter...50 ohms resistive
Ambient conditions

Temperature...63°F ~ 73°F (17°C ~ 23°C)
Humidity..40% ~ 70%

TRANSMITTER

Description	Nominal	Limit
RF: power output..	4.0 watts	3.6~4.4 watts
Antenna spurious emission "IN BRAND"..............		-36 dBm
"OUT BRAND"..........		-54 dBm
Max deviation 20 dB up (1.25 KHz/1.2 KHz Dev)....	2.0 KHz	± 0.2 KHz
Microphone sensitivity..	5 mV	>10 mV
Modulation distortion 1.2 KHz/1 KHz dev..........	4%	>8%
Frequency accuracy..	± 300 Hz	± 600 Hz
Current consumtion..	1000 mA	1500 mA
Stability againts variation of antenna impedance....	Satisfactory when dummy antenna is varied from 40 ohms to 200 ohms	

RECEIVER

Description	Nominal	Limit
Intermediate frequency		
1st IF	10.965 MHz	
2nd IF	455 KHz	
Sensitivity at 20 dB (S+N)/N	0.5 µV (-113 dBm)	1.0 µV(-107dBm)
Adjacent channel rejection	65 dB	54 dB
Image rejection (1st IF/2nd IF)	52 dB	48 dB
IF rejection ratio (1st IF/2nd IF)	52 dB	48 dB
Spurious rejection ratio	52 dB	48 dB
Intermodulation distortion	60 dB	50 dB
Signal to noise ratio at 1 mV input	45 dB	40 dB
Distortion at 1 mV input	3%	>8%
Audio power output at 1 mV RF input		
10 % THD	2.5 W	2.0 W
Squelch	-67dBm	±10 dBm
Current consumption (no signal)	400 mA	>500 mA
Signal meter sensitivity to light 4th bar on LCD	-67 dBm	±10dBm
Receiver spurious Emission	-65 dBm	-57 dBm

OPERATION INSTRUCTIONS

Having properly installed your batteries and hooked-up the antenna, you are now ready to operate your radio for optimum reception and voice transmission.

Turn the power "ON" with ON/OFF switch.

Set the desired channel.

Adjust the squelch control knob to reduce any undesirable background noise when no signal is being received. To do this, select a channel where no signal are present, or wait until signals cease on your channel. Then, rotate the squelch control knob clockwise to a point where the background noise disappears.

> **Note:** When the squelch is set properly, the speaker will remain quiet until a signal is received. In order to receive weak signals, do not set the squelch too high.

Adjust the volume to the desired listening level.

To Transmit

Press and hold the push-to-talk button. Speak slowly and clearly in a normal voice two to three inches from the microphone. A buit-in modulation control circuit will automatically adjust the microphone input level. There is no need to speak loudly.

To Receive

Release the push-to-talk button.

THEORY OF OPERATIONS

TRANSMITTER

A. RF Amplification

The output of double AMP Q301 is fed through tuning IFT L301 and L302 to the base of pre driver AMP Q302. The output is then supplied through tuning circuit L303 to RF driver AMP Q303. The output of Q303 is supplied with tuning circuit L304 and C317,C315,C21 and goes to the base of final RF AMP Q304. The output of Q304 is supplied to the antenna through L-C tuning circuit.

B. Circuit for Suppression of Spurious Radiation

The tuning circuit between the output of final AMP Q304 and antenna, 4-stage "PHI" network L308, C324, C1, C327, L311, C337, C333, L312, C328, C334, C338, L313 serves as a spurious radiation suppressor . This network also serves to match the impedance between TX power AMP Q307 and the antenna.

C. Circuit for Limiting Power

After finished all alignment, the constant voltage supply circuit limits the available power 4 W or slightly less. RV1 and corresponding three transistors control supply voltage of RF amplifier and other circuits.

Tune all the trimmer parts for maximum indication of RF power meter and adjust RV1 to make 4 w indication of RF power meter.

The tuning is adjusted so that the actual power is from 3.8 to 4.0 W. There are no other additional controls for adjusting the TX output power.

D. Modulation Control

a. FM

The mic input is fed to mic audio amplifier IC KIA4558P which drives modulation varicap diode D403 in the VCO circuit. RV401 limits the incoming modulation audio levels to inhibit over modulation. While reading the modulation factor on the modulation analyzing equipment, adjust RV401 shall not exceed +-2.2 KHz/Dev. After 20 dB up from 1.25 KHz/1.2 KHz/Dev. Audio level

b. AM

Modulation signals are filtered with RC network and goes to the audio power AMP IC IC103 to make nominal signal level to achieve wanted modulation. To control incoming audio signal, diode D202 and corresponding ALC circuit limits the modulation shall not exceed +/-90% adjust RV201 +/-90% modulation under 1.0 KHz AF 60% mod plus 20 dB of audio signal.

E. Receiver

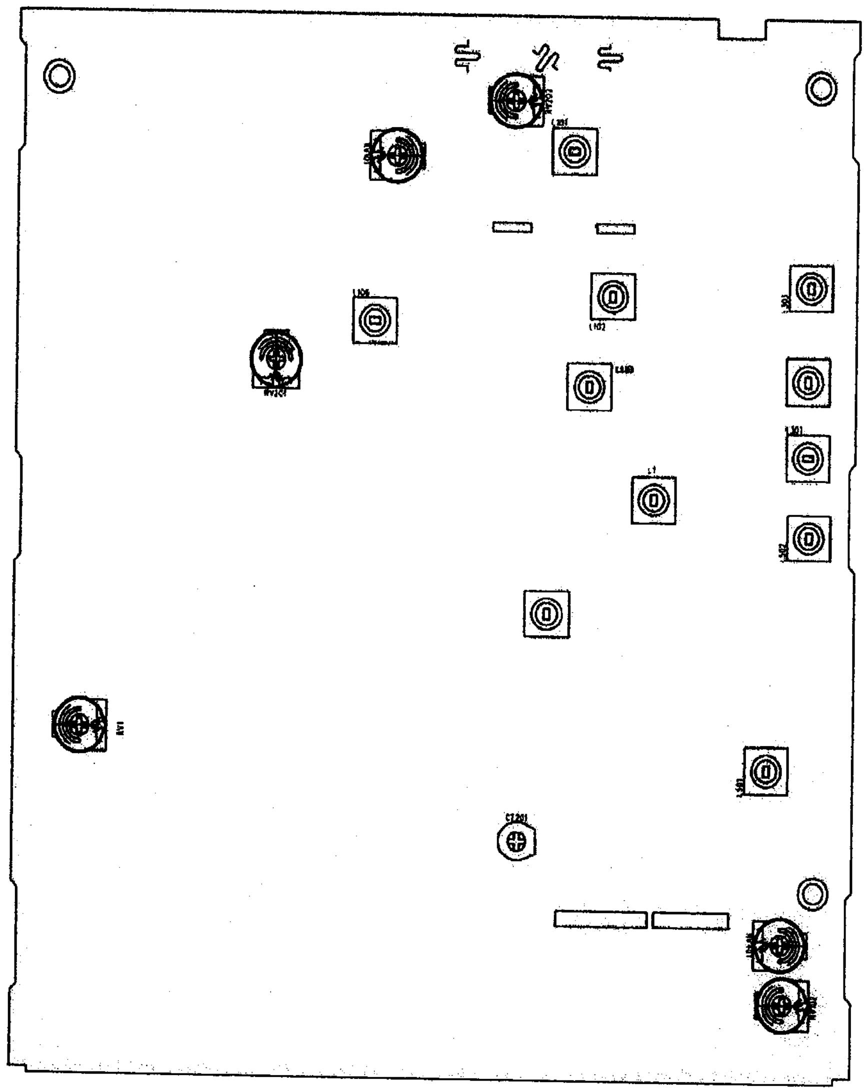
CB receiver is dual conversion supper-heterodyne type with the first IF 10.695 MHz and second IF 455 KHz. Receiver is separated two blocks, 1st IF section and 2nd IF section.
The PLL synthesizer supplies first local frequency 16.270 ~ 16.710 MHz.(for EU) and 16.90625 MHz ~ 17.29625 MHz (for UK) With the provided first local frequencies Q105,Q106 mixes the incoming RF signal to generate first IF signal. Mixed signals were filtered with the XF101 (10.695 MHz) crystal filter and other tuning circuits. Output signal of mixer is filtered with CF101 (455 KHz ceramic filter). The 455 KHz signal from the 2nd IF filter was amplified and limits internaly. After amplification the signals fed the quadrature detector loop L104. Then we can see the recovered audio signals on Pin 11 for FM and Pin 4 for AM of IC102.
With the amplitude of recovered signals, Q112 serves as an audio amplifier.

TROUBLESHOOTING HINTS

Symptom	Probable Cause	Remedy
Unit does not work at all	• Defective power switch VR102. • Blown fuse. • Broken DC power cord. • Defective IC1.	• Replace • Replace • Replace • Replace
No output from speaker at all	• Defective external speaker jack. • Poor connection on microphone connector • Defective push switch on microphone. • Defective internal speaker. • Defective VR102, IC103 other components.	• Repair or replace • Repair or replace • Repair or replace • Replace • Replace the defective components.
No noise on speaker	• Measure all the voltage of IC104 with voltage chart on the page (25-27) • Defective squelch circuit components (RV102, VR101, IC102)	• Replace • Replace
Squelch does not work	• Defective VR101, RV102, IC102.	• Replace the defective components. • Re-adjust
No modulation	• Defective microphone. • Poor audio output and defective modulation microphone amplifier components (IC103, IC104). • Defective microphone connector components. • Defective ALC circuit D413, D414.	• Replace • Replace the defective components. • Replace • Replace the defective components.
LCD meter does not work	• Defective D105. • Defective IC101. • Defective RV101	• Replace • Replace • Replace
LCD display does not work	• Defective RED wire fuse. • Defective IC101, Q401.	• Replace • Replace
Channel selector does not work	• Defective IC101, SW105.	• Replace
CH9 does not work	• Defective EMG SW. • Defective IC101.	• Replace • Replace

TEST EQUIPMENT SETUP AND ALIGNMENT INSTRUCTIONS

ALIGNMENT TEST POINTS AND PARTS LOCATION



ALIGNMENT PROCEDURE

S t	Setting	Connection	Adjuster	Adjust for
1	Frequency adjustment MIC : Receive Volume : optional Squelch : optional CH selector : 19 EU CH9 : off	Frequency counter to dummy load (Figure 1).	CT201	27.185MHz±300Hz
2	RX VCO Voltage adjustment MIC : Receive Volume : optional Squelch : optional CH selector : 1A CH9 : OFF	Connect DC voltmeter between R406, C411 and GND. (Figure 2).	L501	1V

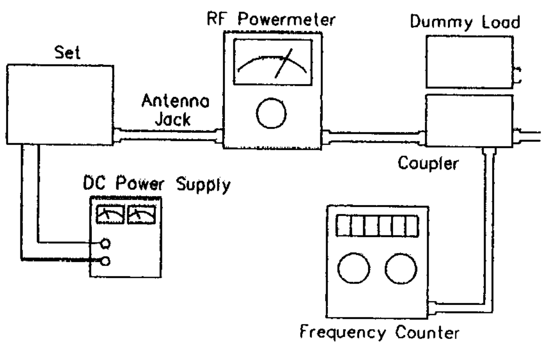


Figure 1

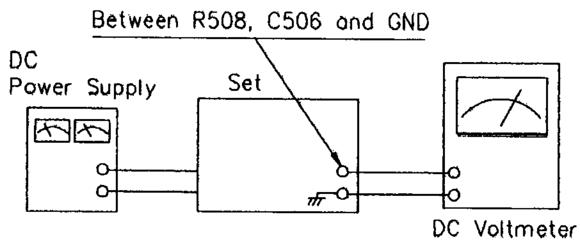


Figure 2

TRANSMITTER SECTION

Test Equipment Required

- RF power meter (RF SSVM)
- 50 ohms dummy load (non-inductive)
- RF attenuator (50 ohms non-inductive)
- Oscilloscope
- Audio generator
- DC power supply (13.2 volt, 3 amp)
- Spectrum analyzer
- Frequency counter
- Coupler

ALIGNMENT PROCEDURE

Step	Setting	Connection	Adjuster	Adjust for
1	RF power stage MIC : Transmit Volume : optional Squelch : optional CH : selector : 19 CH9 : OFF	Connect dummy load and RF power meter to the EXT-ANT jack on the set (Figure 3).	L301 L302 L303	Maximum indication on the power meter (4 watts). If indication is not in 4 watts range, adjust L301, L302, L303.
2	Second harmonic check MIC : Transmit Volume : optional Squelch : optional CH : selector : 19 CH9 : OFF	Connect RF power meter With dummy load to spectrum analyzer through coupler /-40 dB Attenuator to EXT-ANT jack on the set (Figure 4).		At no modulation, compare the level o fundamental frequency to the level of harmonic frequency. Suppression of the 2nd harmonic frequency level must be lower than –80 dB. Check for the other channels.
3	Frequency check MIC : Transmit Volume : optional Squelch : optional CH : selector : 19 CH9 : OFF	Connect dummy load and frequency counter though coupler to RF powermeter. Connect RF powermeter to EXT-ANT jack on the set (Figure 5).	CT201	Be sure that the indication of the transmitter frequency is 27.185MHz±300Hz on the frequency counter.
4	TX power level adjustment Volume : optional Squelch : optional CH : selector : 1 CH9 : OFF	Connect dummy load and oscilloscope through Coupler to RF powermeter connect audio generator to microphone jack (Figure 6).	RV202	Adjust until the 5th bar appears on the channel display LCD.

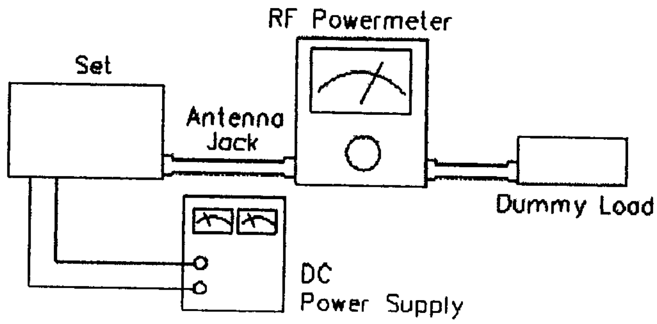


Figure 3

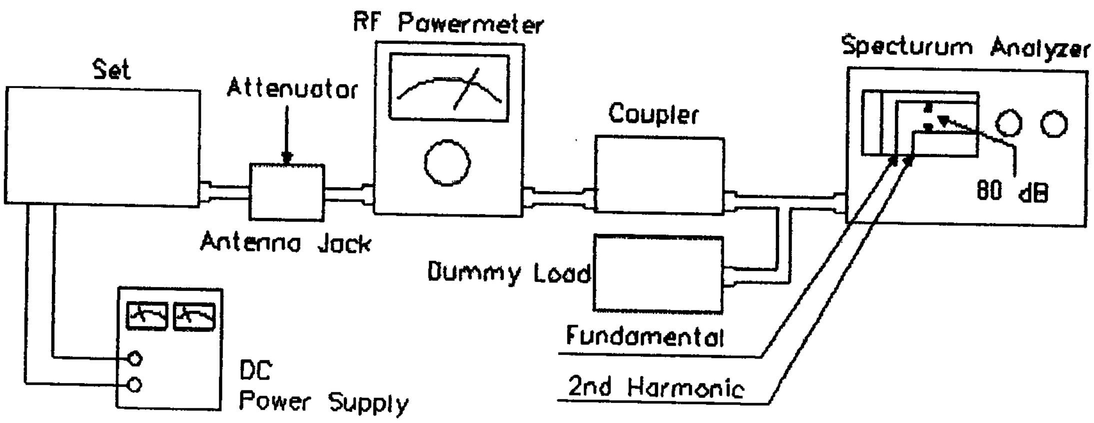


Figure 4

RECEIVER SECTION

Test Equipment Required

- RF Signal generator (RFSG)
- SSVM
- Distortion meter
- DC power supply

ALIGNMENT PROCEDURE

Step	Setting	Connection	Adjuster	Adjust for
1	Audio output adjustment MIC : Receive Volume : Fully clockwise Squelch: Turn to- Counter clockwise CH selector : 19 RF gain : Fully clockwise CH9 : OFF RFSG:27.185 MHz,1kHZ 1μV , 1.5 K Dev.	Connect RF signal generator to EXT-ANT jack. Connect SSVM and distortion meter with 8 ohm dummy load (Figure 7).	L101 L102 L103 L104 L105 L401 L402 L403	Maximum indication on SSVM. Reduce output from RFSG until the audio output becomes about 500mW (2V).
2	Squelch adjustment MIC : Receive Volume : 50mW (2V) Squelch : Clockwise CH selector : 19 RFSG:27.185MHz, 1kHZ 1mV, 1.5K DEV.	Connect RF signal generator to EXT-ANT Jack. Connect SSVM and distortion meter to EXT speaker jack with 8 ohm dummy load (Figure 7).	RV101	Adjust until the audio output appears.
3	RF signal meter adjustment MIC : Receive Volume : 500mW (2V) Squelch : Fully counter Clockwise RFSG: 27.185 MHz, 1kHZ, 1μV, 1.5K Dev.	Connect RF signal generator to EXT-ANT Jack. Connect SSVM and distortion meter to EXT speaker jack with 8 ohm dummy load (Figure 7).	RV101	Adjust until the 3rd LED on the S/RF meter lights up.

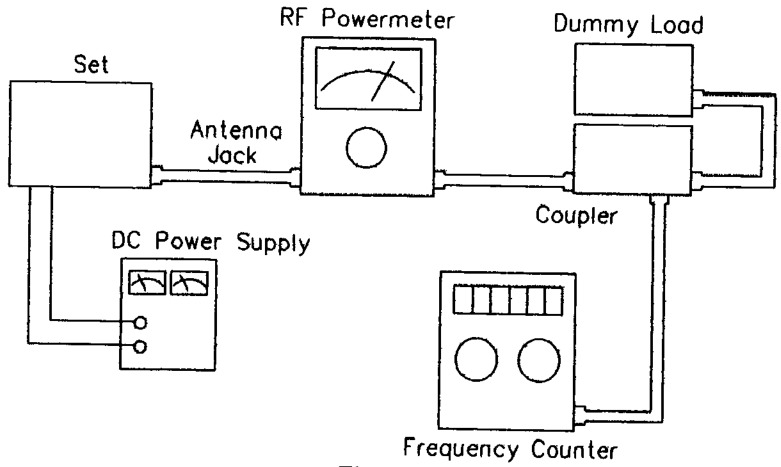


Figure 5

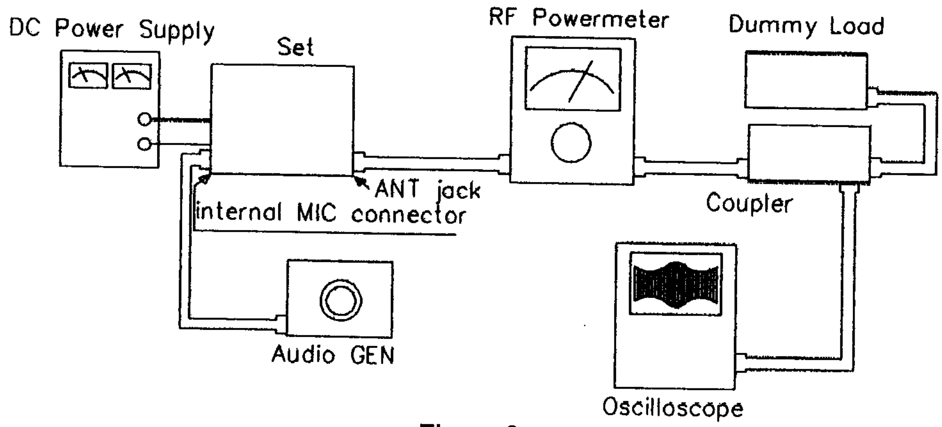


Figure 6

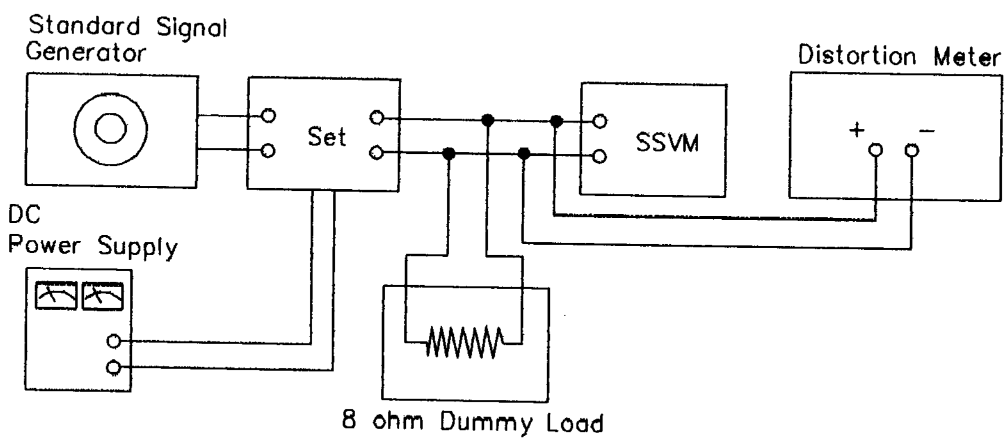
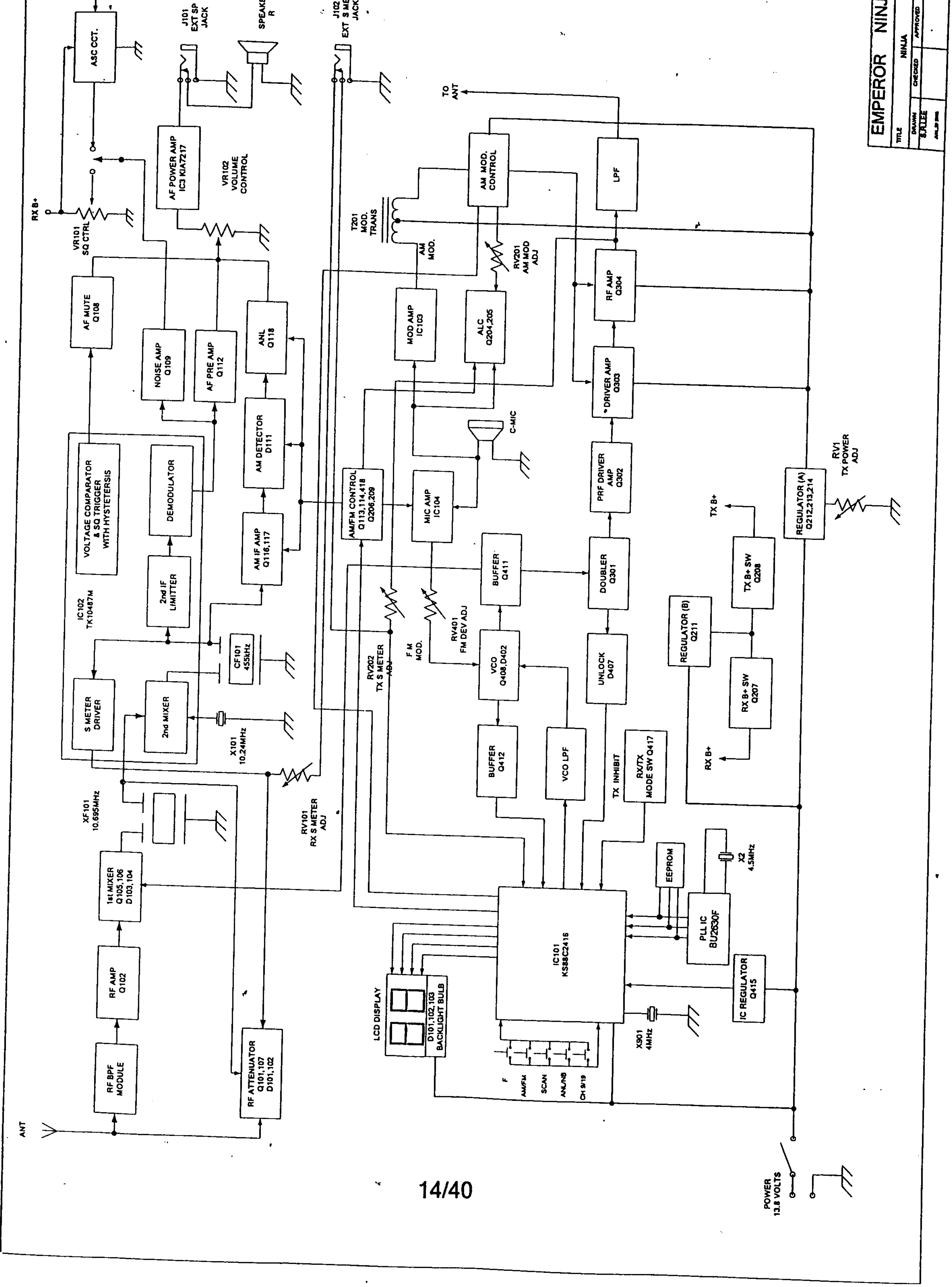
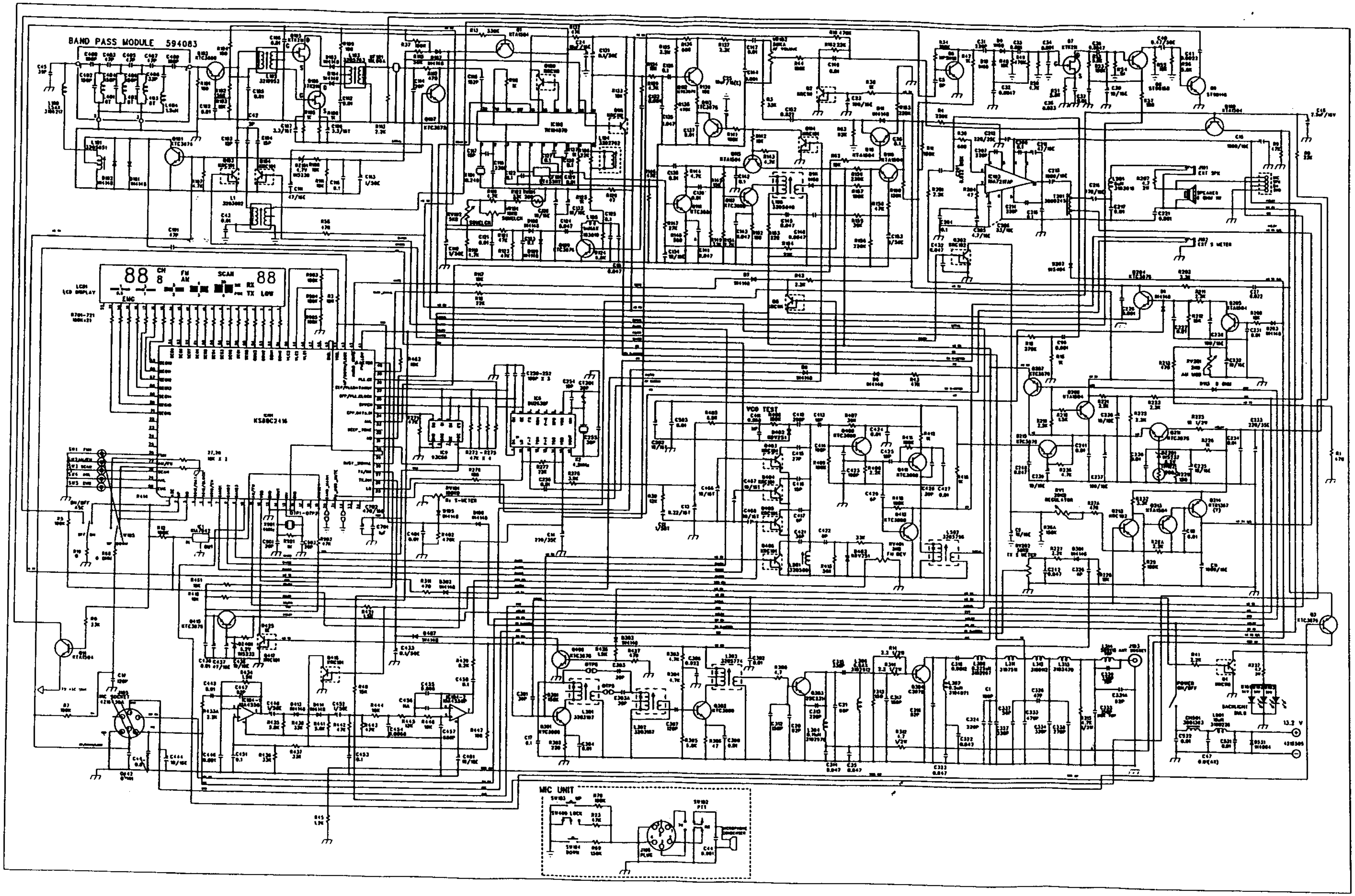


Figure 7

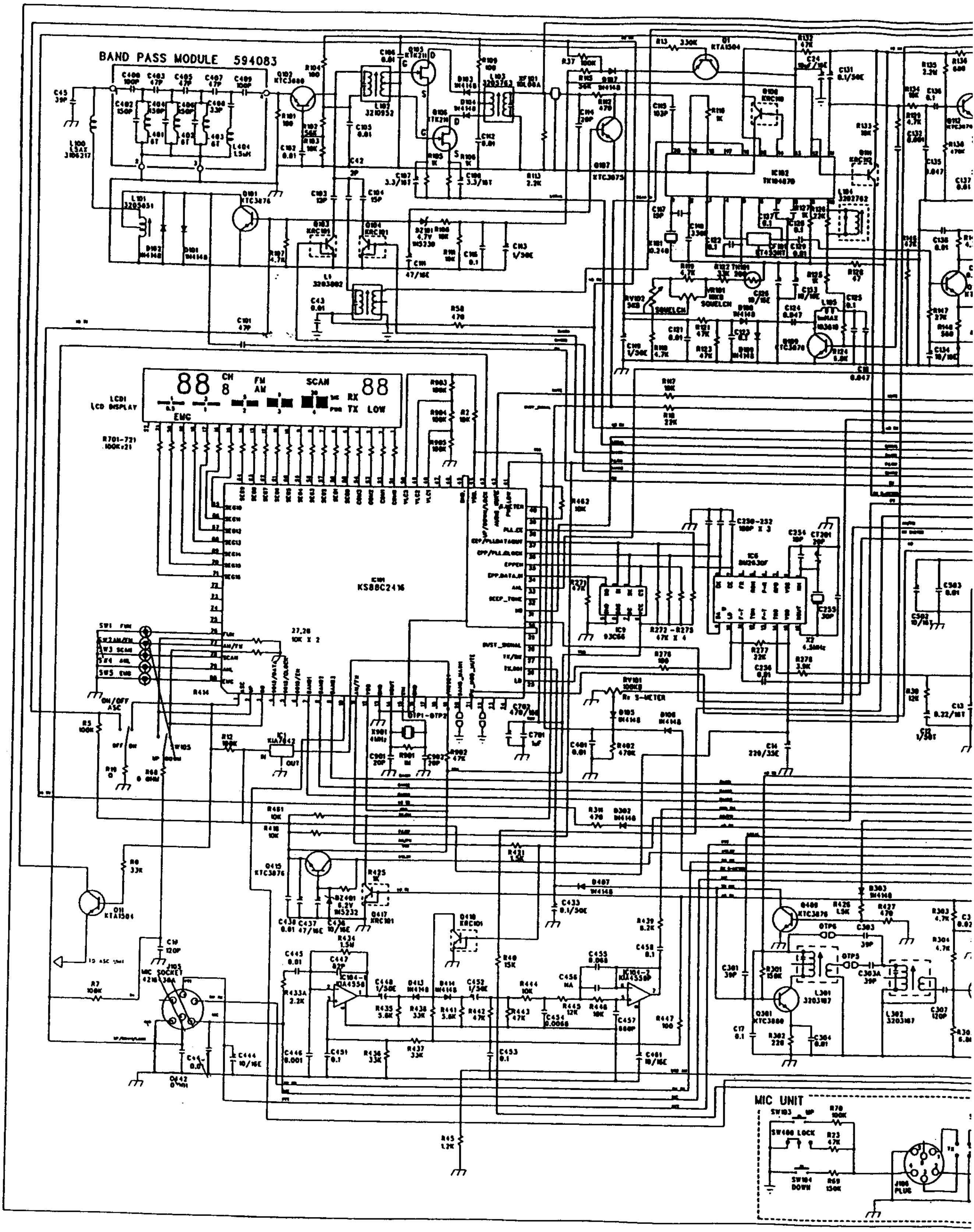
BLOCK DIAGRAM





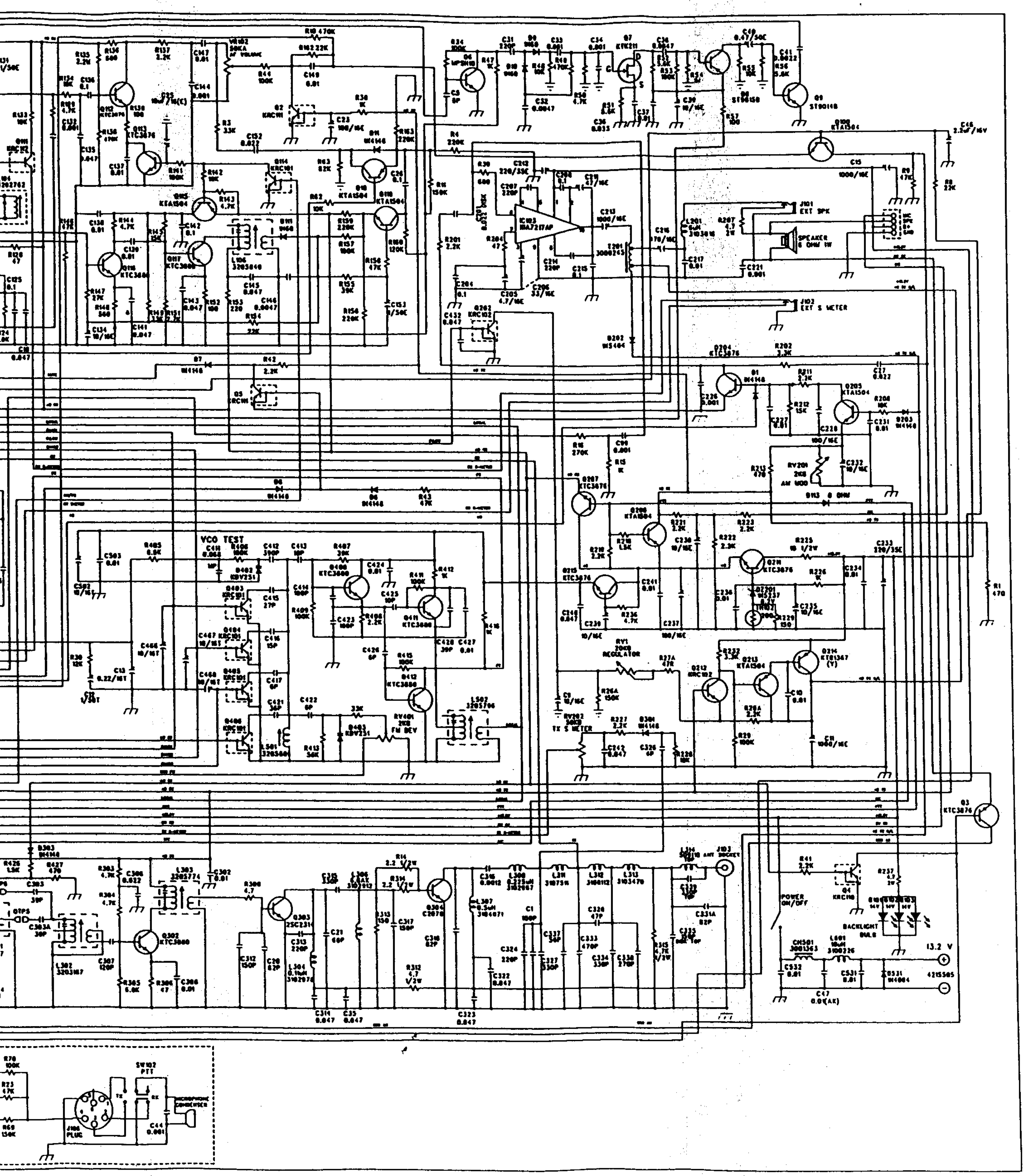
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15 A

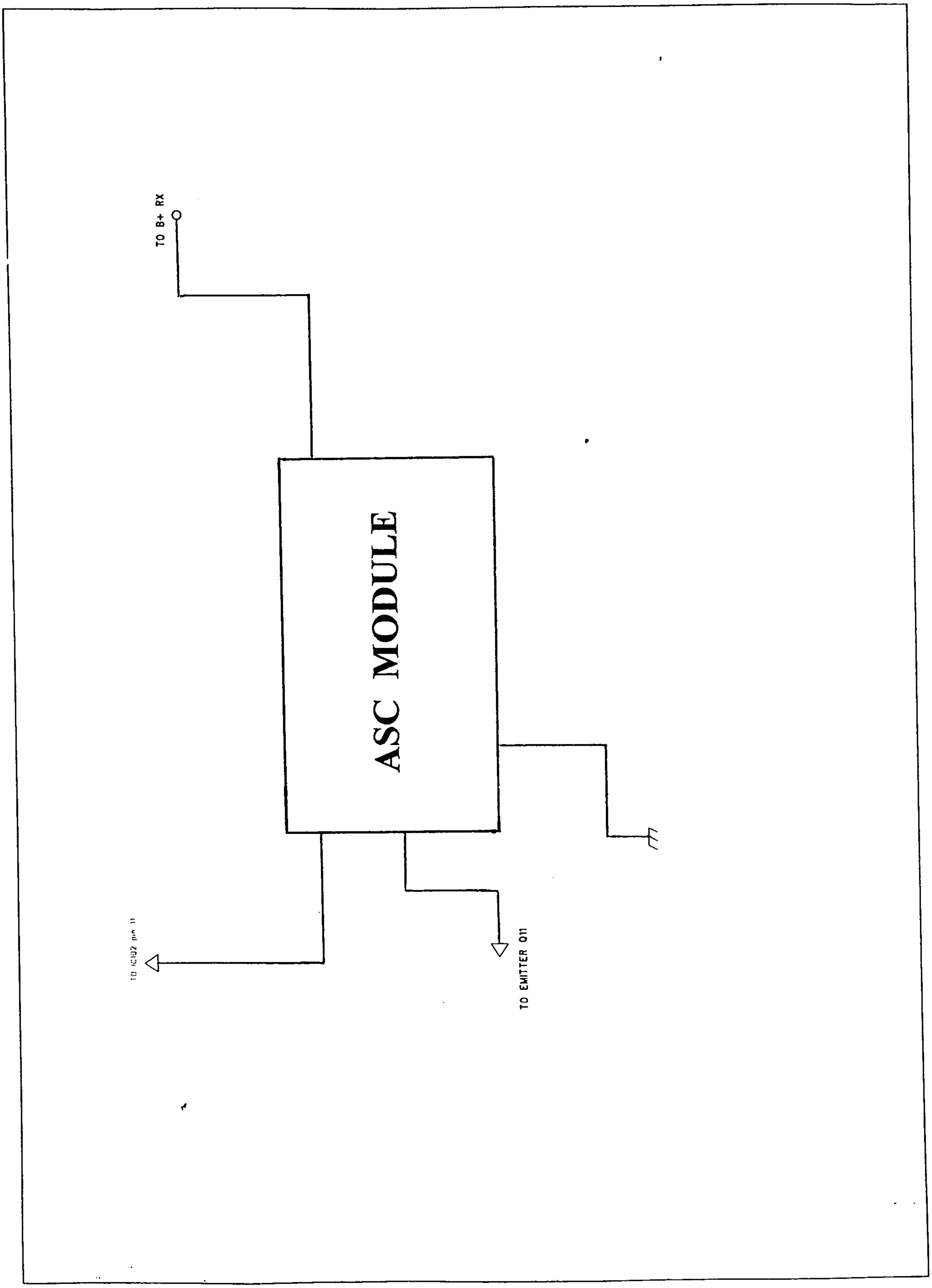


BAND PASS MODULE 594083
LCD1 LCD DISPLAY
IC101 KS88C2416
MIC UNIT
MIC SOCKET

15 B


VCO TEST
EXT SPK
SPEAKER 8 OHM 1W
EXT S METER
POWER ON/OFF
BACKLIGHT BULB
13.2 V
FM DEV
AM MOD
TX S METER
REGULATOR

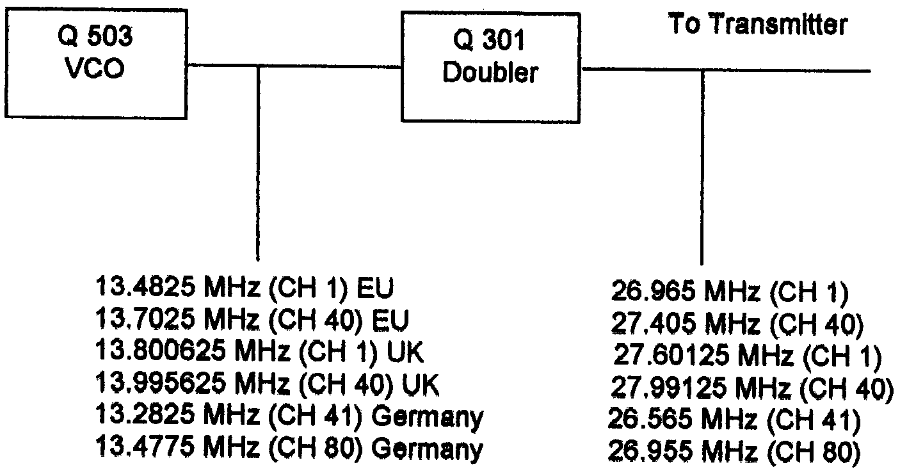
ASC SCHEMATIC DIAGRAM



PLL CIRCUIT BLOCK DIAGRAM

1. INTRODUCTION

The frequencies for transmitter and receiver first local frequencies are all derived from a single 4.5 MHz crystal by means of a phase locked loop. The first local oscillator frequencies are 16.270 MHz (CH 1) to 16.710 MHz (CH 40) for EU , 16.90625 MHz (CH 1) to 17.29625 MHz (CH 40) for UK and 15.870 (CH 41) to 16.260 (CH 80) for Germany. The second local frequency is fixed at 10.240 MHz to generate second IF 455 KHz. During transmit, The VCO of the PLL operates 13.4825 MHz (CH 1) to 13.7025 MHz (CH 40) for EU ,13.800625 MHz (CH 1) to 13.995625 MHz (CH 40) for UK and 13.2825 MHz (CH 41) to 13.4775 MHz (CH 80) for Germany; the VCO frequency gose to the double circuit Q301,L301,L302 which doubles the frequency to generate 26.965 MHz (CH 1) to 27.405 MHz (CH 40) for EU , 27.60125 MHz (CH 1) to 27.99125 MHz (CH 40) for UK and 26.565 MHz (CH 41) to 26.955 MHz (CH 80) for Germany



The VCO operating frequency for the receiver is 15.870,16.270,16.90625 MHz (CH 1) to 16.260, 16.710,17.29625 MHz (CH 40) as the first local oscillator, injected through the buffer AMP Q506 into the first fed balanced mixer Q107,Q108

2. BASIC SYNTHESIZER SCHEME

The crystal frequency (4.500 MHz) is divided by 1800 times to make 2.5 KHz which is fed to one side of the phase detector. The VCO output is divided by a programmable divider, and fed to other side of the phase detector Pin 75 of IC101. The feedback loop is closed by passing the phase detector output through an active low pass filter and using the output to control the VCO frequency through varicap diode D503,D504

Under locked conditions, both of phase detector input signal must be indential at 2.5 KHz. The VCO frequency is then given by:

$$FVCO / N = 0.0025 \text{ MHz} \quad \text{or} \quad FVCO = 0.0025 \times N \text{ MHz}$$

Since "N" is an integer, the VCO frequency can be stepped up with 2.5 KHz increments. By suitable choice of "N" the desired output frequency can be obtained.

	Channel 1		Channel 40		Function
	N	FVCO	N	FVCO	
Transmit	5393	13.4825	5481	13.7025	EU
Receive	6508	16.2700	6684	16.7100	
Transmit	5520.25	13.800625	5598.25	13.995625	UK
Receive	6762.50	16.90625	6918.5	17.29625	
Transmit	5392	13.480	5480	13.700	Poland
Receive	6506	16.265	6682	16.705	

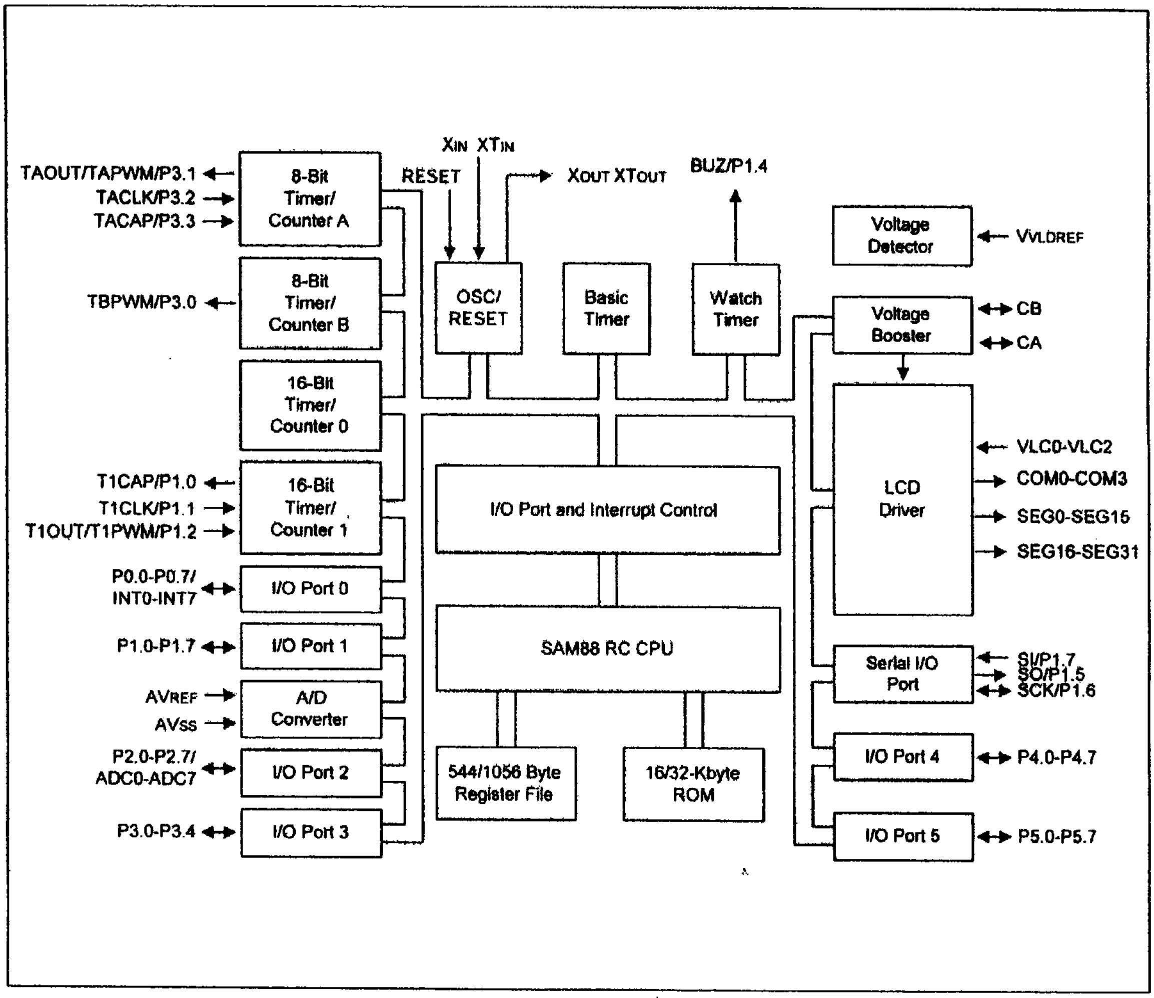
	Channel 41		Channel 80		
Transmit	N		FVCO		Germany
	5313	13.2825	N	FVCO	
Receive	6348	15.870	5391	13.4775	

The VCO frequency goes to the double circuit, which doubles the incoming signals.

	VCO output Frequency	Double output Frequency
Transmit	CH 1, 13.4825 MHz CH 1, 13.800625 MHz CH41, 13.2825 MHz	26.965 MHz 27.60125 MHz 26.565 MHz
Transmit	CH 40, 13.7025 MHz CH 40, 13.995625 MHz CH 80, 13.4775 MHz	27.405 MHz 27.99125 MHz 26.955 MHz

Since all frequencies are obtained from the crystal controlled PLL oscillator, all outputs are coherent with the crystal oscillator frequency and maintaining the same percentage accuracy.

INTERNAL BLOCK DIAGRAM



DIVIDE RATIO, VCO RX/TX FREQUENCIES FOR EACH CHANNEL OF "EU"

Channels	Frequencies (MHz)	RX		TX	
		N	Frequencies MHz	N	Frequencies MHz
1	26.965	6508	16.27	5393	13.4825
2	26.975	6512	16.28	5395	13.4875
3	26.985	6516	16.29	5397	13.4925
4	27.005	6524	16.31	5401	13.5025
5	27.015	6528	16.32	5403	13.5075
6	27.025	6532	16.33	5405	13.5125
7	27.035	6536	16.34	5407	13.5175
8	27.055	6544	16.36	5411	13.5275
9	27.065	6548	16.37	5413	13.5325
10	27.075	6552	16.38	5415	13.5375
11	27.085	6505	16.39	5417	13.5425
12	27.105	6512	16.41	5421	13.5525
13	27.115	6516	16.42	5423	13.5575
14	27.125	6524	16.43	5425	13.5626
15	27.135	6528	16.44	5427	13.5675
16	27.155	6532	16.46	5431	13.5775
17	27.165	6536	16.47	5433	13.5825
18	27.175	6544	16.48	5435	13.5875
19	27.185	6548	16.49	5437	13.5925
20	27.205	6552	16.51	5441	13.6025
21	27.215	6608	16.52	5443	13.6075
22	27.225	6612	16.53	5445	13.6125
23	27.255	6624	16.56	5451	13.6275
24	27.235	6616	16.54	5447	13.6175
25	27.245	6620	16.55	5449	13.6225
26	27.265	6628	16.57	5453	13.6325
27	27.275	6632	16.58	5455	13.6375
28	27.285	6636	16.59	5457	14.6425
29	27.295	6640	16.60	5459	13.6475
30	27.305	6644	16.61	5461	13.6525
31	27.315	6648	16.62	5463	13.6575
32	27.325	6652	16.63	5465	13.6625
33	27.335	6656	16.64	5467	13.6675
34	27.345	6660	16.65	5469	13.6725
35	27.355	6664	16.66	5471	13.6775
36	27.365	6668	16.67	5473	13.6825
37	27.375	6672	16.68	5475	13.6875
38	27.385	6676	16.69	5477	13.6925
39	27.395	6680	16.70	5479	13.6975
40	27.405	6684	16.71	5481	13.7025

DIVIDE RATIO, VCO RX/TX FREQUENCIES FOR EACH CHANNEL OF "UK"

Channels	Frequencies (MHz)	RX		TX	
		N	Frequencies MHz	N	Frequencies MHz
1	27.60125	6546.5	16.90625	5412.25	13.800625
2	27.61125	6766.5	16.91625	5522.25	13.805625
3	27.62125	6770.5	16.92625	5524.25	13.810625
4	27.63125	6774.5	16.93625	5526.25	13.815625
5	27.64125	6778.5	16.94625	5528.25	13.820625
6	27.65125	6782.5	16.95625	5530.25	13.825625
7	27.66125	6786.5	16.96625	5532.25	13.830625
8	27.67125	6790.5	16.67625	5534.25	13.835625
9	27.68125	6794.5	16.98625	5536.25	13.840625
10	27.69125	6798.5	16.99625	5538.25	13.845625
11	27.70125	6802.5	17.00625	5540.25	13.850625
12	27.71125	6806.5	17.01625	5542.25	13.855625
13	27.72125	6810.5	17.02625	5544.25	13.860625
14	27.73125	6814.5	17.03625	5546.25	13.865625
15	27.74125	6818.5	17.04625	5548.25	13.870625
16	27.75125	6822.5	17.05625	5550.25	13.875625
17	27.76125	6826.5	17.06625	5552.25	13.880625
18	27.77125	6830.5	17.07625	5554.25	13.885625
19	27.78125	6834.5	17.08625	5556.25	13.890625
20	27.79125	6838.5	17.09625	5558.25	13.895625
21	27.80125	6842.5	17.10625	5560.25	13.900625
22	27.81125	6846.5	17.11625	5562.25	13.905625
23	27.82125	6850.5	17.12625	5564.25	13.910625
24	27.83125	6854.5	17.13625	5566.25	13.915625
25	27.84125	6858.5	17.14625	5568.25	13.920625
26	27.85125	6861.5	17.15625	5570.25	13.925625
27	27.86125	6866.5	17.16625	5572.25	13.930625
28	27.87125	6870.5	17.17625	5574.25	13.935625
29	27.88125	6874.5	17.18625	5576.25	13.940625
30	27.89125	6878.5	17.19625	5578.25	13.945625
31	27.90125	6882.5	17.20625	5580.25	13.950625
32	27.91125	6886.5	17.21625	5582.25	13.955625
33	27.92125	6890.5	17.22625	5584.25	13.960625
34	27.93125	6844.5	17.23625	5586.25	13.965625
35	27.94125	6898.5	17.24625	5588.25	13.970625
36	27.95125	6902.5	17.25625	5590.25	13.975625
37	27.96125	6906.5	17.26625	5592.25	13.980625
38	27.97125	6910.5	17.27625	5594.25	13.985625
39	27.98125	6914.5	17.28625	5596.25	13.990625
40	27.99125	6918.5	17.29625	5598.25	13.995625

DIVIDE RATIO, VCO RX/TX FREQUENCIES FOR EACH CHANNEL OF "Germany"

Channels	Frequencies (MHz)	RX		TX	
		N	Frequencies MHz	N	Frequencies MHz
41	26.565	6348	15.870	5313	13,2825
42	26.575	6352	15.880	5315	13,2875
43	26.585	6356	15.890	5317	13,2925
44	26.595	6360	15.900	5319	13,2975
45	26.605	6364	15.910	5321	13,3025
46	26.615	6368	15.920	5323	13,3075
47	26.625	6372	15.930	5325	13,3125
48	26.635	6376	15.940	5327	13,3175
49	26.645	6380	15.950	5329	13,3225
50	26.655	6384	15.960	5331	13,3275
51	26.665	6388	15.970	5333	13,3325
52	26.675	6392	15.980	5335	13,3375
53	26.685	6396	15.990	5337	13,3425
54	26.695	6400	16.000	5339	13,3475
55	26.705	6404	16.010	5341	13,3525
56	26.715	6408	16.020	5343	13,3575
57	26.725	6412	16.030	5345	13,3625
58	26.735	6416	16.040	5347	13,3675
59	26.745	6420	16.050	5349	13,3725
60	26.755	6424	16.060	5351	13,3775
61	26.765	6428	16.070	5353	13,3825
62	26.775	6432	16.080	5355	13,3875
63	26.785	6436	16.090	5357	13,3925
64	26.795	6440	16.100	5359	13,3975
65	26.805	6444	16.110	5361	13,4025
66	26.815	6448	16.120	5363	13,4075
67	26.825	6452	16.130	5365	13,4125
68	26.835	6456	16.140	5367	13,4175
69	26.845	6460	16.150	5369	13,4225
70	26.855	6464	16.160	5371	13,4275
71	26.865	6468	16.170	5373	13,4325
72	26.875	6472	16.180	5375	13,4375
73	26.885	6476	16.190	5377	13,4425
74	26.895	6480	16.200	5379	13,4475
75	26.905	6484	16.210	5381	13,4525
76	26.915	6488	16.220	5383	13,4575
77	26.925	6492	16.230	5385	13,4625
78	26.935	6496	16.240	5387	13,4675
79	26.945	6500	16.250	5389	13,4725
80	26.955	6504	16.260	5391	13,4775

DIVIDE RATIO, VCO RX/TX FREQUENCIES FOR EACH CHANNEL OF "Italy 2"

Channels	Frequencies (MHz)	RX		TX	
		N	Frequencies MHz	N	Frequencies MHz
1	26.965	6508	16.27	5393	13,4825
2	26.975	6512	16.28	5395	13,4875
3	26.985	6516	16.29	5397	13,4925
4	27.005	6524	16.31	5401	13,5025
5	27.015	6528	16.32	5403	13,5075
6	27.025	6532	16.33	5405	13,5125
7	27.035	6536	16.34	5407	13,5175
8	27.055	6544	16.36	5411	13,5275
9	27.065	6548	16.37	5413	13,5325
10	27.075	6552	16.38	5415	13,5375
11	27.085	6505	16.39	5417	13,5425
12	27.105	6512	16.41	5421	13,5525
13	27.115	6516	16.42	5423	13,5575
14	27.125	6524	16.43	5425	13,5626
15	27.135	6528	16.44	5427	13,5675
16	27.155	6532	16.46	5431	13,5775
17	27.165	6536	16.47	5433	13,5825
18	27.175	6544	16.48	5435	13,5875
19	27.185	6548	16.49	5437	13,5925
20	27.205	6552	16.51	5441	13,6025
21	27.215	6608	16.52	5443	13,6075
22	27.225	6612	16.53	5445	13,6125
23	27.255	6624	16.56	5451	13,6275
24	27.245	6620	16.55	5449	13,6225
25	27.265	6628	16.57	5453	13,6325
26	26.875	6472	16.18	5375	13,4375
27	26.885	6476	16.19	5377	13,4425
28	26.895	6480	16.20	5379	13,4475
29	26.905	6484	16.21	5381	13,4525
30	26.915	6488	16.22	5383	13,4575
31	26.925	6492	16.23	5385	13,4625
32	26.935	6496	16.24	5387	13,4675
33	26.945	6500	16.25	5389	13,4725
34	26.955	6504	16.26	5391	13,4775

DIVIDE RATIO, VCO RX/TX FREQUENCIES FOR EACH CHANNEL OF "Poland"

Channels	Frequencies (MHz)	RX		TX	
		N	Frequencies MHz	N	Frequencies MHz
1	26.960	6506	16.265	5392	13.480
2	26.970	6510	16.275	5394	13.485
3	26.980	6514	16.285	5396	13.490
4	27.000	6522	16.305	5400	13.500
5	27.010	6526	16.315	5402	13.505
6	27.020	6530	16.325	5404	13.510
7	27.030	6534	16.335	5406	13.515
8	27.050	6542	16.355	5410	13.525
9	27.060	6546	16.365	5412	13.530
10	27.070	6550	16.375	5414	13.535
11	27.080	6554	16.385	5416	13.540
12	27.100	6562	16.405	5420	13.550
13	27.110	6566	16.415	5422	13.555
14	27.120	6570	16.425	5424	13.560
15	27.130	6574	16.435	5426	13.565
16	27.150	6582	16.455	5430	13.575
17	27.160	6586	16.465	5432	13.580
18	27.170	6590	16.475	5434	13.585
19	27.180	6594	16.485	5436	13.590
20	27.200	6602	16.505	5440	13.600
21	27.210	6606	16.515	5442	13.605
22	27.220	6610	16.525	5444	13.610
23	27.250	6622	16.555	5450	13.625
24	27.230	6614	16.535	5446	13.615
25	27.240	6618	16.545	5448	13.620
26	27.260	6626	16.565	5452	13.630
27	27.270	6630	16.575	5454	13.635
28	27.280	6634	16.585	5456	13.640
29	27.290	6638	16.595	5458	13.645
30	27.300	6642	16.605	5460	13.650
31	27.310	6646	16.615	5462	13.655
32	27.320	6650	16.625	5464	13.660
33	27.330	6654	16.635	5466	13.665
34	27.340	6658	16.645	5468	13.670
35	27.350	6662	16.655	5470	13.675
36	27.360	6666	16.665	5472	13.680
37	27.370	6670	16.675	5474	13.685
38	27.380	6674	16.685	5476	13.690
39	27.390	6678	16.695	5478	13.695
40	27.400	6682	16.705	5480	13.700

3. DESCRIPTIONS OF EACH BLOCK

A. Introduction

The synthesizer is implemented with the following

Components:

PLL IC (IC6)
X-TAL (X2)
VCO, VARICAP DOIDE (D402,D403)

IC101 is a cmos LSI that includes most of PLL block and driver, the Q401-Q406, C412, C415, C416, C417 and L501, Varicap diode D402,D403 are clapp oscillator circuit to operate as a VCO of the IC101. Q406 is a switching transistor to connect or disconnect the tuning capacitor in the VCO oscillator tank circuit for transmitter or receiver. Q408 works as a buffer AMP for RX local frequencies (16 MHz) and TX generating frequencies (13 MHz).

B. Reference frequency

The crystal, X2 (4.500 MHz) and other components at PIN 1 and 80 of IC101 can make a reference frequency oscillator with internal amplifier.

C. VCO

Q503 and surrounding parts are consisting a clapp oscillator works as a VCO of IC101. the VCO can be oscillate over the required of 13.2825 MHz to 17.29625 MHz

D. Phase detector and VCO control

The detector is a digital phase comparator which compares the phase of the reference signal with programmable divider output square waves and develops a series of pulses whose DC level depends on the phase error of each signal.

E. Transmitter/Receiver buffer AMP

Output signal of Q503 is fed into buffer AMP Q411,

F. Transmitter doubler

The output signals of Q411 goes to an amplifier with tuning circuit Q301,L301,L302 which doubles incoming 13 MHz signals.

G. Switching of tuning capacitor in VCO

The VCO circuit must tune with a wide rang of frequencies 13.4825 ~ 13.7025 MHz (EU), 13.800625 ~ 13.995625 MHz (UK),13.2825 MHz ~13.4775 MHz (Germany) for transmitter and 16.270~16.710 MHz (EU), 16.90625 ~ 17.29625 MHz (UK), 15.870 ~ 16.260MHz (Germany) for receiver. To comply above rang of VCO, the tuning capacitance should switched for transmission or reception.

H. Receiver local oscillator outputs

First Mixer:

The secondary output signals is injected to the sources of 1st mixer Q105,Q106 in the 1st IF mixer section

Second Mixer:

The output of 10.24 MHz oscillator circuit with X-1 is injected into the IF IC internally. Incoming IF signal and 10.24 MHz are mixed inside the IF IC to extract 2nd IF signal 455 KHz. FM,AM audio signals are recovered with the way of quadrature detector, AM signals are recovered with envelope detector.

4. FREQUENCY STABILITY

LET : Fo = Crystal oscillator frequency

Fr = Phase detector reference frequency

Fvco = VCO frequency

Ft = Transmit frequency

Then : Fr = Fo/1800

And under locked conditions : Fr = Fvco / N

WHERE, "N" is the programmable divider divide ratio.

THEN : Fvco = N X Fr

From which it can be seen, the percentage error in Ft is the same as the percentage error in Fo. The stability of the crystal oscillator is determined primarily by the crystal itself and having lesser deviation by the active and passive components of the oscillator. The choice of crystal and component is such that the required frequency stability is maintained over the required voltage and temperature rang.

FREQUENCY CHARTS

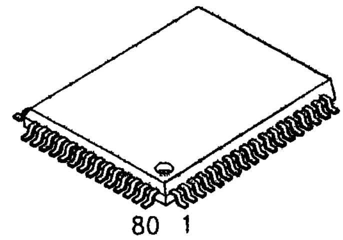
Channel No.	Frequency (MHz) EC, EU, E, I	Frequency (MHz) UK	Frequency (MHz) PL
1	26.965	27.60125	26.960
2	26.975	27.61125	26.970
3	26.985	27.62125	26.980
4	27.005	27.63125	27.000
5	27.015	27.64125	27.010
6	27.025	27.65125	27.020
7	27.035	27.66125	27.030
8	27.055	27.67125	27.050
9	27.065	27.68125	27.060
10	27.075	27.69125	27.070
11	27.085	27.70125	27.080
12	27.105	27.71125	27.100
13	27.115	27.72125	27.110
14	27.125	27.73125	27.120
15	27.135	27.74125	27.130
16	27.155	27.75125	27.150
17	27.165	27.76125	27.160
18	27.175	27.77125	27.170
19	27.185	27.78125	27.180
20	27.205	27.79125	27.200
21	27.215	27.80125	27.210
22	27.225	27.81125	27.220
23	27.255	27.82125	27.250
24	27.235	27.83125	27.230
25	27.245	27.84125	27.240
26	27.265	27.85125	27.260
27	27.275	27.86125	27.270
28	27.285	27.87125	27.280
29	27.295	27.88125	27.290
30	27.305	27.89125	27.300
31	27.315	27.90125	27.310
32	27.325	27.91125	27.320
33	27.335	27.92125	27.330
34	27.345	27.93125	27.340
35	27.355	27.94125	27.350
36	27.365	27.95125	27.360
37	27.375	27.96125	27.370
38	27.385	27.97125	27.380
39	27.395	27.98125	27.390
40	27.405	27.99125	27.400

Channel No. Germany	Frequency (MHz) Germany
41	26.565
42	26.575
43	26.585
44	26.595
45	26.605
46	26.615
47	26.625
48	26.635
49	26.645
50	26.655
51	26.665
52	26.675
53	26.685
54	26.695
55	26.705
56	26.715
57	26.725
58	26.735
59	26.745
60	26.755
61	26.765
62	26.775
63	26.785
64	26.795
65	26.805
66	26.815
67	26.825
68	26.835
69	26.845
70	26.855
71	26.865
72	26.875
73	26.885
74	26.895
75	26.905
76	26.915
77	26.925
78	26.935
79	26.945
80	26.955

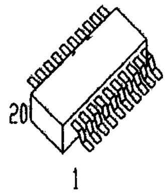
SEMICONDUCTOR LEAD IDENTIFICATION AND IC INTERNAL CONNECTIONS

INTERATED CIRCUITS

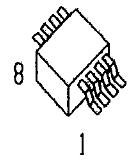
IC101 : KS88C2416



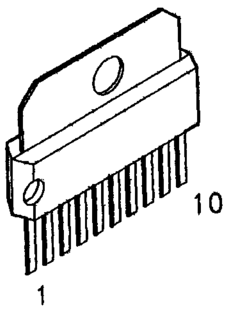
IC102 : TK10487



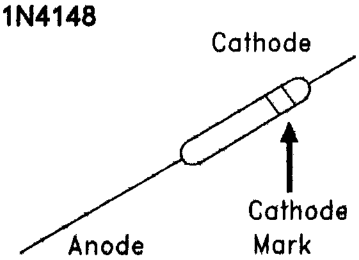
IC103A : 4558
8 PIN



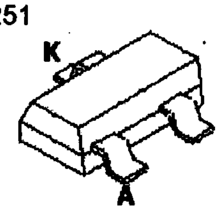
IC104 : KIA7217A



DIODES
1N4148

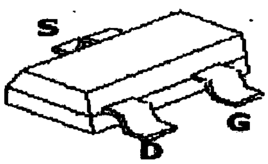


KDV251

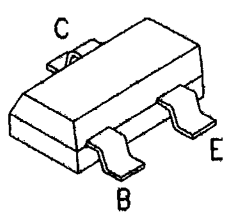


TRANSISTORS

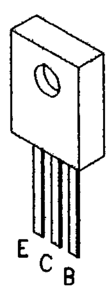
KTK211



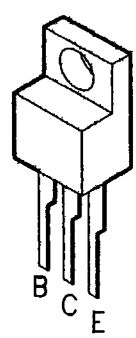
KRC101S, KRC110,
KTC3876, KTC3880
KTC3875,3880
KRC101~



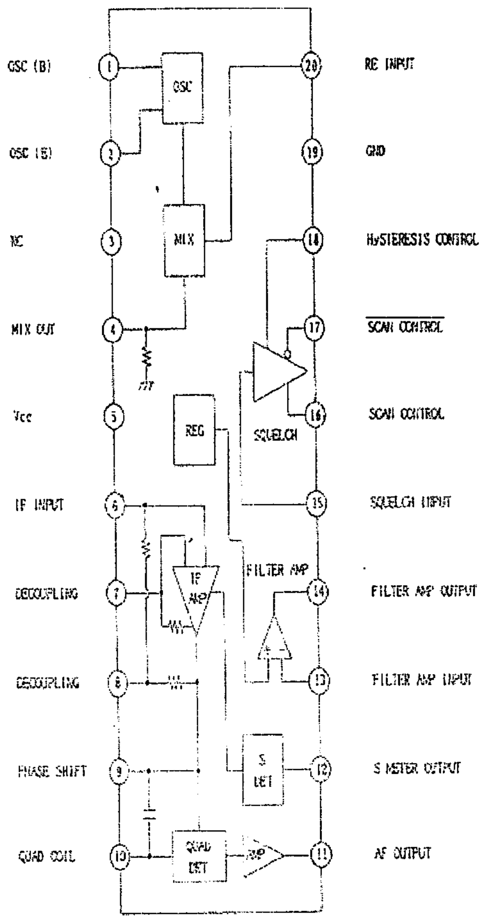
2SC2314



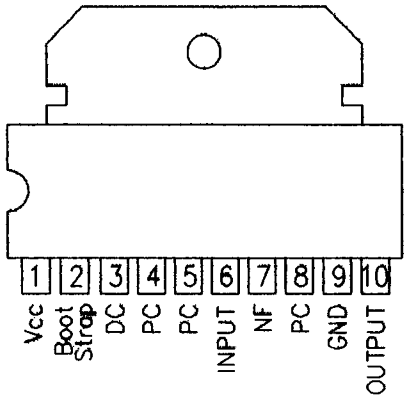
2SC2078,KTB1367



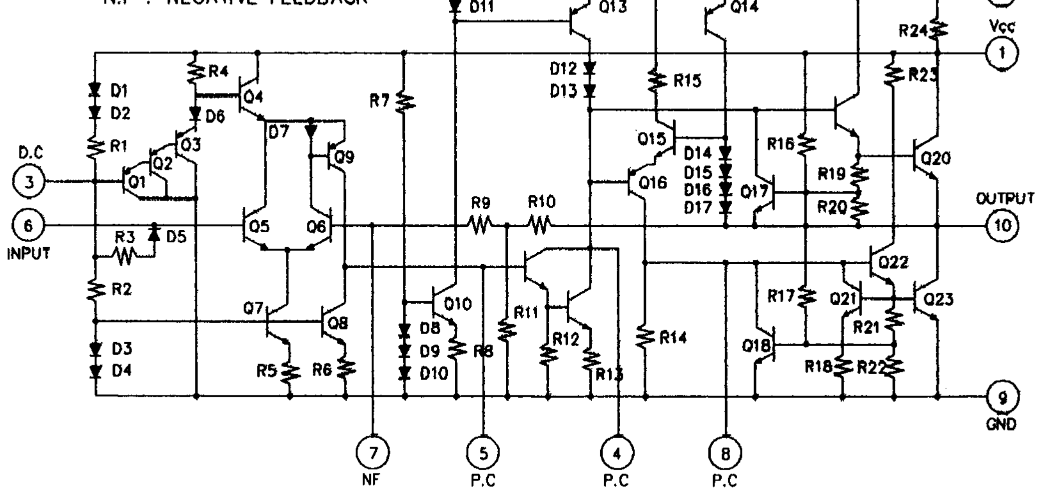
IC102 TK10487
Data Sheet



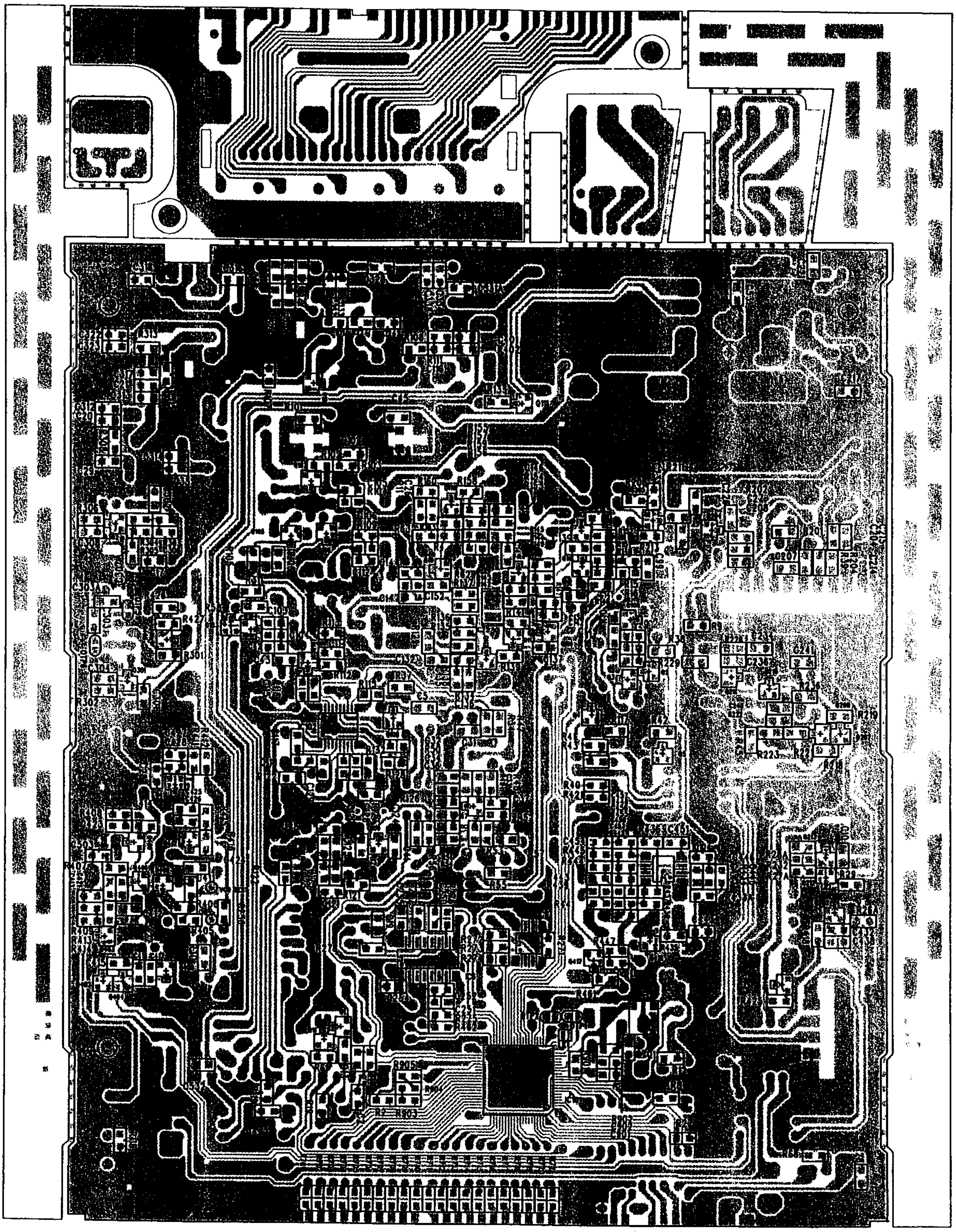
IC104 KIA7217A



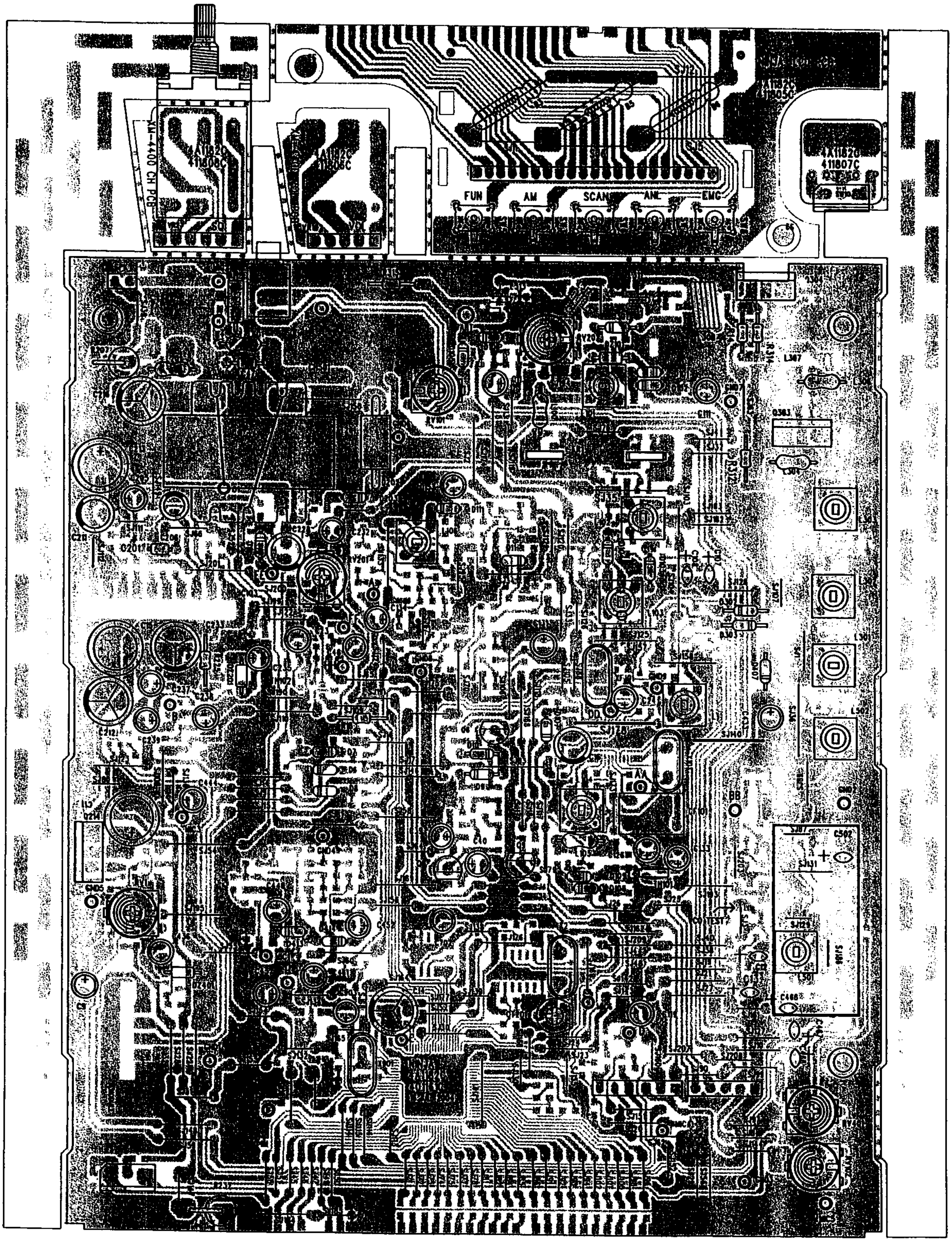
D.C : DE COUPLING
P.C : PHASE COMPENSATION
N.F : NEGATIVE FEEDBACK



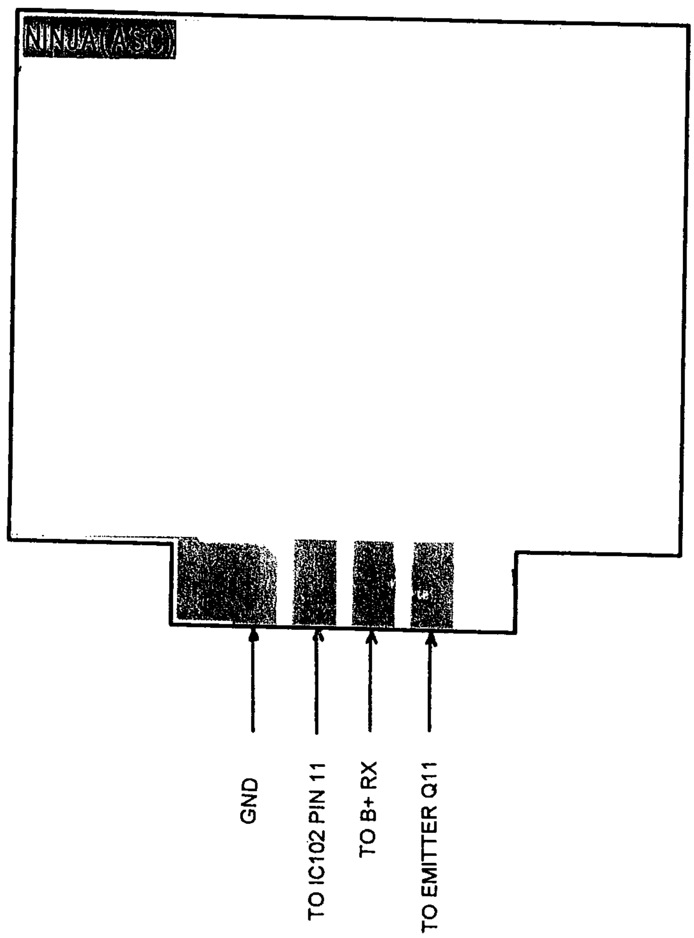
BOTTOM VIEW OF PCB BOARD



TOP VIEW OF PCB BOARD



ASC VIEW OF PCB BOARD



VOLTAGE CHART

1. IC's

IC	Pin NO.	RX		TX	
		ASC ON	ASC OFF	ASC ON	ASC OFF
IC101 KS88C2416	1	0.05	5.00	0.13	5.07
	2	0.05	0.05	0.13	0.13
	3	0.05	0.05	0.13	0.13
	4	0.05	0.05	0.13	0.13
	5	0.05	0.05	0.13	0.13
	6	0.05	0.05	0.13	0.13
	7	0.05	0.05	0.13	0.13
	8	4.70	4.70	4.75	4.75
	9	0.05	0.05	0.13	0.13
	10	0.05	0.05	5.11	5.11
	11	0.05	0.05	0.13	0.13
	12	5.06	5.06	5.12	5.12
	13	0.05	0.05	0.13	0.13
	14	2.50	2.50	2.57	2.57
	15	2.50	2.50	2.57	2.57
	16	0.05	0.05	0.13	0.13
	17	2.43	2.43	2.50	2.50
	18	2.48	2.48	2.55	2.55
	19	5.04	5.04	5.10	5.10
	20	0.05	0.05	0.13	0.13
	21	0.05	0.05	1.58	1.58
	22	5.04	5.04	5.10	5.10
	23	5.04	5.04	5.10	5.10
	24	5.04	5.04	5.10	5.10
	25	5.05	5.05	3.40	3.40
	26	0.05	0.05	5.10	5.10
	27	5.05	5.05	0.13	0.13
	28	1.71	1.71	0.85	0.85
	29	0.05	0.05	0.13	0.13
	30	5.05	5.05	5.10	5.10
	31	0.05	0.05	0.13	0.13
	32	0.03	0.03	0.15	0.15

IC	Pin NO.	RX		TX	
		ASC ON	ASC OFF	ASC ON	ASC OFF
IC101 KS88C2416	33	5.05	5.05	5.10	5.10
	34	3.23	3.23	3.28	3.28
	35	0.06	0.06	0.14	0.14
	36	0.06	0.06	0.14	0.14
	37	0.06	0.06	0.14	0.14
	38	0.06	0.06	0.14	0.14
	39	5.05	5.05	5.10	5.10
	40	0.68	0.68	2.36	2.36
	41	4.92	4.92	4.97	4.97
	42	0.06	0.06	0.17	0.17
	43	4.97	4.97	5.03	5.03
	44	5.09	5.09	5.15	5.15
	45	0.05	0.05	0.12	0.12
	46	1.24	1.24	1.31	1.31
	47	2.88	2.88	2.95	2.95
	48	1.67	1.67	1.74	1.74
	49	3.25	3.25	3.31	3.31
	50	4.90	4.90	4.97	4.97
	51	2.45	2.45	2.55	2.55
	52	2.45	2.45	2.55	2.55
	53	2.45	2.45	2.55	2.55
	54	2.45	2.45	2.55	2.55
	55	2.45	2.45	2.55	2.55
	56	2.45	2.45	2.55	2.55
	57	2.45	2.45	2.55	2.55
	58	2.45	2.45	2.53	2.53
	59	2.45	2.45	2.52	2.52
	60	2.44	2.44	2.52	2.52
	61	2.45	2.45	2.55	2.55
	62	2.45	2.45	2.55	2.55
	63	2.45	2.45	2.55	2.55
	64	2.45	2.45	2.55	2.55

IC	Pin NO.	RX		TX	
		ASC ON	ASC OFF	ASC ON	ASC OFF
IC101 KS88C2416	65	2.45	2.45	2.52	2.52
	66	2.45	2.45	2.52	2.52
	67	2.45	2.45	2.52	2.52
	68	2.45	2.45	2.52	2.52
	69	2.45	2.45	2.52	2.52
	70	2.45	2.45	2.52	2.52
	71	2.48	2.48	2.52	2.52
	72	2.45	2.45	2.52	2.52
	73	2.45	2.45	2.52	2.52
	74	2.45	2.45	2.52	2.52
	75	0.25	0.25	0.32	0.32
	76	5.05	5.05	5.11	5.11
	77	5.05	5.05	5.11	5.11
	78	5.05	5.05	5.11	5.11
	79	5.05	5.05	5.11	5.11
	80	5.05	5.05	5.11	5.11
IC102 TK10487	1	6.55	6.50	0.23	0.23
	2	6.14	6.09	0.06	0.06
	3	0	0	0	0
	4	6.23	6.19	0.23	0.23
	5	6.58	6.53	0.23	0.23
	6	5.59	5.64	0	0
	7	5.68	5.63	0	0
	8	5.68	5.64	0	0
	9	6.52	6.48	0.23	0.23
	10	6.49	6.54	0.23	0.23
	11	2.96	2.94	0	0
	12	2.33	2.33	0.59	0.59
	13	1.41	1.65	-0.10	-0.10
	14	0.80	0.80	0.15	0.15
	15	2.83	2.83	0.60	0.60
	16	1.71	1.71	0.85	0.85
	17	0.05	0.05	0.09	0.09
	18	0.11	0.11	0.13	0.13
	19	0.05	0.05	0.13	0.13
	20	1.88	1.88	0.13	0.13

IC	Pin NO.	RX		TX	
		ASC ON	ASC OFF	ASC ON	ASC OFF
IC103 KIA7217A	1	13.33	13.33	12.64	12.64
	2	12.94	12.94	11.46	11.46
	3	3.90	3.90	3.82	3.82
	4	8.00	8.00	7.70	7.70
	5	1.44	1.44	1.54	1.54
	6	3.39	3.39	3.29	3.29
	7	3.40	3.40	3.29	3.29
	8	0.85	0.85	1.32	1.32
	9	0.05	0.05	0.13	0.13
	10	6.79	6.79	6.48	6.48
IC104 KIA4558	1	0	0	3.74	3.74
	2	0	0	3.84	3.84
	3	0.09	0.09	3.83	3.83
	4	0.05	0.05	0.13	0.13
	5	0.09	0.09	3.56	3.56
	6	0	0	3.65	3.65
	7	0	0	3.67	3.67
	8	0.11	0.11	7.53	7.53
IC6 BU2630F	1	2.20	2.20	2.24	2.24
	2	0.05	0.05	0.12	0.12
	3	0.16	0.16	0.20	0.20
	4	0.04	0.04	0.11	0.11
	5	0.16	0.16	0.16	0.16
	6	0.05	0.05	0.12	0.12
	7	0.06	0.06	0.13	0.13
	8	0.06	0.06	0.13	0.13
	9	0.06	0.06	0.13	0.13
	10	5.08	5.08	5.14	5.14
	11	2.42	2.42	2.51	2.51
	12	0.46	0.46	0.51	0.51
	13	0.51	0.51	0.55	0.55
	14	1.75	1.75	1.28	1.28
	15	5.10	5.10	5.16	5.16
	16	1.96	1.96	2.03	2.03

IC	Pin NO.	RX		TX	
		ASC ON	ASC OFF	ASC ON	ASC OFF
IC1 KIA7042	1	5.09	5.09	5.15	5.15
	2	0.05	0.05	0.12	0.12
	3	5.08	5.08	5.13	5.13
IC9 93C66	1	0.06	0.06	0.14	0.14
	2	0.06	0.06	0.14	0.14
	3	0.06	0.06	0.14	0.14

IC	Pin NO.	RX		TX	
		ASC ON	ASC OFF	ASC ON	ASC OFF
IC9 93C66	4	3.23	3.23	3.29	3.29
	5	0.05	0.05	0.13	0.13
	6	0.05	0.05	0.13	0.13
	7	0.08	0.08	0.12	0.12
	8	5.06	5.06	5.12	5.12

2. TRANSISTORS

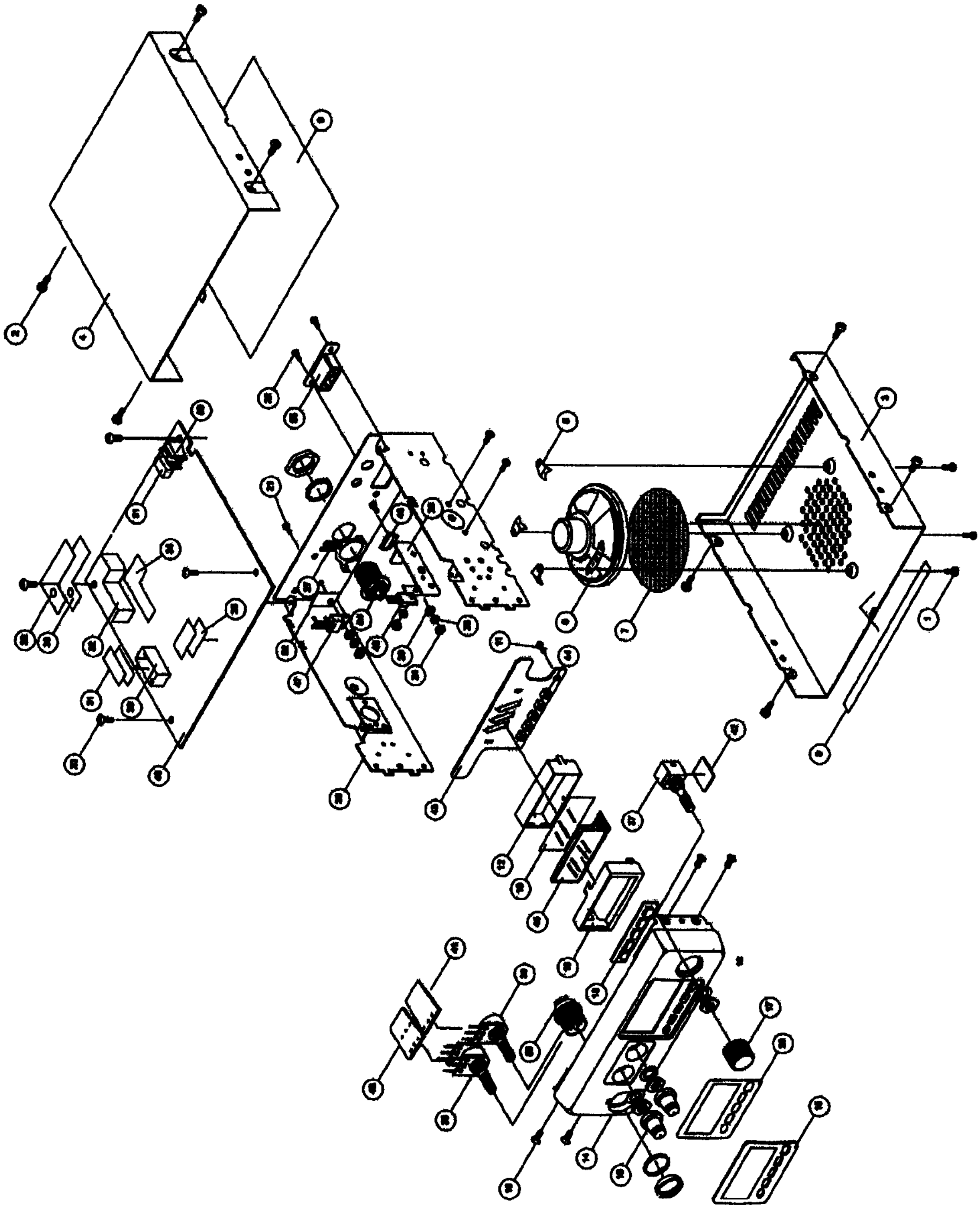
TR \ Pin No.	Receiver						Transmitter					
	B		E		C		B		E		C	
	ASC ON	ASC OFF	ASC ON	ASC OFF	ASC ON	ASC OFF	ASC ON	ASC OFF	ASC ON	ASC OFF	ASC ON	ASC OFF
Q1	4.88	1.12	1.66	1.64	1.40	1.63	4.94	0.12	0.15	0.15	-0.10	-0.10
Q2	0.13	0.13	0.05	0.05	0.24	0.24	0.12	0.12	7.23	7.23	0.12	0.12
Q3	0.05	0.05	0.07	0.07	0.06	0.06	0.12	0.12	0.12	0.12	1.16	1.16
Q4	5.06	5.06	0.05	0.05	0.05	0.05	0.22	0.22	0.12	0.12	0.12	0.12
Q5	1.63	1.63	0.05	0.05	0.05	0.05	0.21	0.21	0.12	0.12	6.65	6.65
Q6	0.79	0.79	0.05	0.05	3.78	3.78	0.22	0.22	0.12	0.12	0.22	0.22
Q7	0.05 (D)	0.05 (D)	0.05 (G)	0.05 (G)	0.05 (S)	0.05 (S)	0.12 (D)	0.12 (D)	0.12 (G)	0.12 (G)	0.12 (S)	0.12 (S)
Q8	0.05	0.05	0.05	0.05	0.05	0.05	0.12	0.12	0.12	0.12	0.12	0.12
Q9	0.05	0.05	0.05	0.05	0	0	0.12	0.12	0.12	0.12	0	0
Q10	5.09	5.09	1.76	1.76	1.38	1.38	5.12	5.12	0.17	0.17	0.12	0.12
Q11	0.82	5.04	1.41	2.10	1.40	1.63	0.12	5.10	0.17	0.17	-0.10	-0.10
Q100	0.05	0.05	0.45	0.45	0.06	0.06	5.14	5.14	0.35	0.35	0.12	0.12
Q101	0.16	0.16	0.05	0.05	0.05	0.05	0.85	0.85	0.12	0.12	0.12	0.12
Q102	1.58	1.58	0.85	0.85	6.65	6.65	0.15	0.15	0.12	0.12	0.22	0.22
Q103	4.73	4.73	0.05	0.05	0.05	0.05	4.79	4.79	0.12	0.12	0.12	0.12
Q104	0.05	0.05	0.05	0.05	0.07	0.07	0.12	0.12	0.12	0.12	0.10	0.10
Q105	6.02 (D)	6.02 (D)	0.05 (G)	0.05 (G)	0.53 (S)	0.53 (S)	0.12 (D)	0.12 (D)	0.12 (G)	0.12 (G)	0.14 (S)	0.14 (S)
Q106	6.02 (D)	6.02 (D)	0.05 (G)	0.05 (G)	0.52 (S)	0.52 (S)	0.12 (D)	0.12 (D)	0.12 (G)	0.12 (G)	0.14 (S)	0.14 (S)
Q107	0.61	0.61	0.05	0.05	0.05	0.05	0.86	0.86	0.12	0.12	0.12	0.12
Q108	0.07	0.07	0.05	0.05	2.84	2.84	0.17	0.17	0.12	0.12	0.59	0.59
Q109	0.69	0.69	0.05	0.05	0.74	0.74	0.22	0.22	0.12	0.12	0.22	0.22
Q111	2.31	2.31	1.79	1.79	6.88	6.88	0.57	0.57	0.16	0.16	0.21	0.21
Q112	0.65	0.65	0.09	0.09	6.58	6.58	0.13	0.13	0	0	0.22	0.22
Q113	0.65	0.65	0.05	0.05	0.06	0.06	0.22	0.22	0.12	0.12	0	0

TR \ Pin No.	Receiver						Transmitter					
	B		E		C		B		E		C	
	ASC ON	ASC OFF	ASC ON	ASC OFF	ASC ON	ASC OFF	ASC ON	ASC OFF	ASC ON	ASC OFF	ASC ON	ASC OFF
Q114	0.05	0.05	0.05	0.05	6.25	6.25	0.12	0.12	0.12	0.12	0.22	0.22
Q115	6.83	6.83	7.10	7.10	0.06	0.06	0.22	0.22	0.22	0.22	0.12	0.12
Q116	0.07	0.07	0.05	0.05	0.06	0.06	0.12	0.12	0.12	0.12	0.12	0.12
Q117	0.05	0.05	0.05	0.05	7.10	7.10	0.12	0.12	0.12	0.12	0.22	0.22
Q118	1.21	1.21	1.76	1.76	1.76	1.76	0.12	0.12	0.14	0.14	0.17	0.17
Q202	5.00	5.00	0.05	0.05	0.07	0.07	5.04	5.04	0.12	0.12	0.14	0.14
Q204	0	0	0.05	0.05	0	0	0	0	0.12	0.12	0.12	0.12
Q205	0.23	0.23	0.08	0.08	0.05	0.05	2.17	2.17	2.70	2.70	0.88	0.88
Q207	7.76	7.76	7.10	7.10	8.14	8.14	0.12	0.12	0.22	0.22	8.15	8.15
Q208	7.76	7.76	8.14	8.14	0.13	0.13	7.30	7.30	8.14	8.14	7.96	7.96
Q211	8.73	8.73	8.13	8.13	12.88	12.88	8.74	8.74	8.13	8.13	11.69	11.69
Q212	0.13	0.13	6.98	6.98	12.46	12.46	7.96	7.96	6.91	6.91	11.28	11.28
Q213	12.47	12.47	13.02	13.02	13.01	13.01	11.27	11.27	11.94	11.94	11.78	11.78
Q214	13.00	13.00	13.25	13.25	12.97	12.97	11.84	11.84	12.52	12.52	11.73	11.73
Q215	7.93	7.93	7.31	7.31	8.14	8.14	7.93	7.93	7.31	7.31	8.14	8.14
Q301	0.05	0.05	0.05	0.05	0.13	0.13	1.84	1.84	1.21	1.21	7.93	7.93
Q302	0.08	0.08	0.05	0.05	0.13	0.13	1.62	1.62	1.01	1.01	7.94	7.94
Q303	0.05	0.05	0.05	0.05	16.65	16.65	0.10	0.10	0.12	0.12	9.06	9.06
Q304	0.05	0.05	0.05	0.05	16.55	16.55	0.09	0.09	0.12	0.12	9.96	9.96
Q403	0.05	0.05	0.05	0.05	2.30	2.30	0.12	0.12	0.12	0.12	2.30	2.30
Q404	4.73	4.73	0.05	0.05	0.05	0.05	4.79	4.79	0.12	0.12	0.12	0.12
Q405	0.05	0.05	0.05	0.05	0.22	0.22	0.12	0.12	0.12	0.12	0.22	0.22
Q406	0.13	0.13	0.05	0.05	0.58	0.58	7.94	7.94	0.12	0.12	0.12	0.12
Q408	4.85	4.85	4.27	4.27	7.31	7.31	4.85	4.85	4.24	4.24	7.31	7.31
Q409	0.77	0.77	0.05	0.05	0.05	0.05	0.12	0.12	0.12	0.12	1.84	1.84
Q411	0.78	0.78	0.05	0.05	3.80	3.80	0.77	0.77	0.12	0.12	3.74	3.74
Q412	0.78	0.78	0.05	0.05	3.76	3.76	0.84	0.84	0.12	0.12	3.81	3.81
Q415	5.69	5.69	5.08	5.08	13.28	13.28	5.75	5.75	5.14	5.14	12.38	12.38
Q417	0.13	0.13	0.05	0.05	5.09	5.09	7.96	7.96	0.12	0.12	0.13	0.13
Q418	0.05	0.05	0.05	0.05	0.13	0.13	0.12	0.12	0.12	0.12	1.12	1.12

3. DIODES

Diode \ Pin No.	RX				TX			
	Anode		Kathode		Anode		Kathode	
	ASC ON	ASC OFF	ASC ON	ASC OFF	ASC ON	ASC OFF	ASC ON	ASC OFF
D402	0.05	0.05	5.03	5.03	0.12	0.12	5.03	5.03
D403	0.05	0.05	0.05	0.05	0.12	0.12	0.12	0.12

EXPLODED VIEW



EXPLODED VIEW PART LIST

No.	Part Number	Material & Description	Q'Ty	Remark
1.	623-344	(+)TAPPING SCREW(BH)3X8-2S BLK	3	SPK MTG:3
2.	633-082	(+)TAP TITE SCREW BH3X6 BLK	8	UP.BO+MAIN BODY MTG
3.	719-308-A	BOTTOM COVER SPCC+VINYL SHEET T0.95 BLK	1	
4.	719-309-A	UPPER COVER SPCC+VINYL SHEET T0.95 BLK	1	
5.	730-015-A	HOLDER(SPK) EGI T1 USCOATING	3	
6.	4201076	SPEAKER 8 OHM 3.0W	1	
7.	900-708	FELT &77XT0.3 FELT	1	BOTTOM COVER (SPK HOLE)
8.	905-508	FELT FELT 6X130XT0.3 BLK STIC.	2	UP.BO COVER (FRONT)
9.	905-550-A	INSULATION PLATE INSULATION PAPER T0.25	1	
10.	613-183	(+)MACHINE SCREW(FH)3X6 ZN-PLAT	4	ESC+MAIN BODY MTG
11.	621-007	(+)TAPPING SCREW(PH)2.6X4-2S ZN-PLAT	2	ESC+SUB PCB LCD
12.	71A-247	HOUSING LCD ABS 94HB	1	
13.	723-998	BRACKET LCD SPTE T0.3	1	
14.	801-816	E.S.C ABS 94HB	1	
15.	814-502	LENS ACRYL	1	
16.	826-143	KNOB VOL ABS 94HB BLK	2	
17.	826-606	KNOB CH ABS 94HB	1	
18.	896-202	KEY PAD SILICONE RUBBER	1	
19.	907-400	PLATE BACK PC T0.25 EMBOSSING	1	
20.	907-447	TAPE LENS 3M T0.1	1	
21.	613-077	(+)MACHINE SCREW(PH)3X10 ZN-PLAT	2	TR MTG:2
22.	613-271	(+)MACHINE SCREW(BH)3X6 ZN-PLAT	3	PWR JACK:2 , IC MTG:1
23.	623-238	(+)TAPPING SCREW(BH)3X5-2S ZN-PLAT	5	HEAT SINK:2,MAIN BODY+PCB
24.	651-024	NUT SS41 M3-1S ZN-PLAT	5	PWR JACK:2.TR MTG:2.IC MTG:1
25.	662-305	WASHER (SPRING) M3 ZN-PLAT	5	PWR JACK:2.TR MTG:2.IC MTG:1
26.	701-926-BB	BODY MAIN EGI T1.0US COATING	1	
27.	732-560	HOLDER(ANT MTG) SPTE T0.3	1	
28.	761-500-B	HEAT SINK ALP3 95X22XT2	1	
29.	853-105	BUSHING NYLON66+GLASS	2	POWER TR MTG . IC MTG
30.	771-525	SHIELD HOUSHING SPTE T0.3	1	
31.	771-530	SHIELD PLATE SPTE T0.3	2	
32.	772-238	SHIELD HOUSING SPTE T0.3	1	
33.	772-274-A	SHIELD PLATE SPTE T=0.3	1	
34.	772-665	SHIELD PLATE SPTE T0.3	1	
35.	905-685-A	INSULATION PLATE INSULATION PAPER T0.25	2	
36.	906-591	INSULATION PLATE INSULATION PAPER T0.25	1	
37.	430-049-8Y	SW ROTARY YPS2	1	SW105
38.	450-622-1	50KA:RK16311	1	VR102
39.	450-401-9	10KA:RK1631111ZOB-1	1	
40.	411-806-B	Sub PCB	1	
41.	411-808-B	Sub PCB	1	
42.	411-807-B	Sub PCB	1	
43.	411-805-C	LCD PCB	1	
44.	436-059-7Z	TM115AP SW TACT	5	
45.	252-311-8	ISO06468P LCD DISPL	1	LCD1
46.	222-006-4	KIA7217AP	1	IC103
47.	204-010-1	2SC2078(E)	1	Q304
48.	202-066-2	KTB1367	1	Q214
49.	401-161-C	Main PCB	1	
50.	420-705-1Z	TC38-078-01	1	J101
51.	420-726-3X	FJ-2506 2.5MM	1	J102
52.	440-020-4	0.1T:15X13 MICA	1	
53.	421-643-6A	Mic Connector	1	
54.	421-046-7	Ant Connector	1	
55.	421-550-5	Jack power	1	

Annex : Emperor Ninja part list

		PARTS LIST		
MODEL CODE	: 3357	EMPEROR NINJA CB		
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SEQ LEVEL	PART-NO.	NAME & DESCRIPTION	Q'TY	UT
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1 2	533-57A-MA	ASC MODULE ASS'Y	1	EA
3	060-000-8Z	CHIP RESISTOR 0 1/10W 5% T 2012	1	EA
3	060-102-7Z	CHIP RESISTOR 1K 1/10W 5% T 2012	3	EA
3	060-103-8Z	CHIP RESISTOR 10K 1/10W 5% T 2012	1	EA
3	060-123-6Z	CHIP RESISTOR 12K 1/10W 5% T 2012	1	EA
3	060-154-4Z	CHIP RESISTOR 150K 1/10W 5% T 2012	1	EA
3	060-182-9Z	CHIP RESISTOR 1.8K 1/10W 5% T 2012	1	EA
3	060-223-3Z	CHIP RESISTOR 22K 1/10W 5% T 2012	1	EA
3	060-331-7Z	CHIP RESISTOR 330 1/10W 5% T 2012	2	EA
3	060-473-2Z	CHIP RESISTOR 47K 1/10W 5% T 2012	1	EA
3	060-682-4Z	CHIP RESISTOR 6.8K 1/10W 5% T 2012	2	EA
3	060-683-5Z	CHIP RESISTOR 68K 1/10W 5% T 2012	2	EA
3	075-103-6	RES.CHIP TRIMMER 10K RH03E1C14X	1	EA
3	102-300-2	ELECT CAPACITOR 22UF 16V 20% 4X7	1	EA
3	130-172-2Y	CHIP CERAMIC 0.01UF GRM40 X7R103K 50V PT	2	EA
3	130-347-4Y	CHIP CERAMIC 0.33UF GRM40 Y5V334Z 16V PT	2	EA
3	130-424-0Y	CHIP CERAMIC 0.047UF GRM40 X7R473K 50V PT	1	EA
3	134-719-7Y	CHIP CERAMIC 0.0047UF GRM40 X7R472K 50V PT	4	EA
3	222-018-5A	I.C KIA324F-EL	1	EA
3	241-091-1Z	DIODE ZENER 4V7HCCST	1	EA
3	243-019-7Z	DIODE 1N4148	5	EA
3	411-804-A	P.C.B ASC 28.1 X31 X1.6 FR4 1/1	1	EA
2 2	533-57C-A	COVER ASS'Y	1	EA
3	420-107-6	SPEAKER 8 OHM 3.0W 77MM P-302RL	1	EA
3	623-344	(+)TAPPING SCREW(BH)3X8-2S BLK	3	EA
3	633-082	(+)TAP TITE SCREW BH3X6 BLK	8	EA
3	719-308-A	BOTTOM COVER SPCC+VINYL SHEET T0.95 BLK	1	EA
3	719-309-A	UPPER COVER SPCC+VINYL SHEET T0.95 BLK	1	EA
3	730-015-A	HOLDER(SPK) EGI T1 USCOATING	3	EA
3	891-590	CUSHION 25X25XT5 RUBB.SP0.BLK STIC.	1	EA
3	900-708	FELT &77XT0.3 FELT	1	EA
3	905-508	FELT FELT 6X130XT0.3 BLK STIC.	2	EA
3	905-550-A	INSULATION PLATE INSULATION PAPER T0.25	1	EA
3 2	533-57E-A	ESCUTCHEON ASS'Y	1	EA
3	613-183	(+)MACHINE SCREW(FH)3X6 ZN-PLAT	4	EA
3	621-007	(+)TAPPING SCREW(PH)2.6X4-2S ZN-PLAT	2	EA
3	71A-247	HOUSING LCD ABS 94HB	1	EA
3	723-998	BRACKET LCD SPTE T0.3	1	EA
3	801-816	E.S.C ABS 94HB	1	EA
3	814-502	LENS ACRYL	1	EA
3	826-143	KNOB VOL ABS 94HB BLK	2	EA
3	826-606	KNOB CH ABS 94HB	1	EA
3	896-202	KEY PAD SILICONE RUBBER	1	EA
3	907-400	PLATE BACK PC T0.25 EMBOSSING	1	EA
3	907-447	TAPE LENS 3M T0.1	1	EA
4 2	533-57F-B	FRONT BODY ASS'Y	1	EA
3	202-066-2	TRANSISTOR KTB1367	1	EA
3	204-010-1	TRANSISTOR 2SC2078(E)	1	EA
3	222-006-4	I.C KIA7217AP	1	EA
3	420-705-1Z	JACK DC TC38-078-01	1	EA
3	420-726-3X	JACK MINIATURE FJ-2506 2.5MM	1	EA
3	421-046-7	CONNECTOR CH-239(A) SW-1229	1	EA
3	421-550-5	CONNECTOR SOCKET SW-1464	1	EA
3	421-595-6	CONNECTOR SCN-16-6(BR):SW-1610	1	EA
3	429-265-8Z	FLAT WIRE 11PIN 60MM 2.5PITCH	1	EA
3	429-283-4Z	FLAT WARE 03P 100MM 2.5PITCH (77-250C)	1	EA
3	430-049-8Y	SW ROTARY YPS210120SK	1	EA
3	440-020-4	MICA 0.1T:15X13 MICA FOR TR	1	EA
3	450-401-9	VR 10KA:RK1631111ZOB-10KA	1	EA
3	450-622-1	VR 50KA:RK16311116B253A	1	EA
3	613-077	(+)MACHINE SCREW(PH)3X10 ZN-PLAT	2	EA
3	613-271	(+)MACHINE SCREW(BH)3X6 ZN-PLAT	3	EA
3	623-238	(+)TAPPING SCREW(BH)3X5-2S ZN-PLAT	5	EA
3	651-024	NUT SS41 M3-1S ZN-PLAT	5	EA
3	662-305	WASHER (SPRING) M3 ZN-PLAT	5	EA
3	701-926-BB	BODY MAIN EGI T1.0US COATING	1	EA
3	732-560	HOLDER(ANT MTG) SPTE T0.3	1	EA
3	761-500-B	HEAT SINK ALP3 95X22XT2	1	EA

3	853-105	BUSHING NYLON66+GLASS	2	EA
3	95B-147	LABEL NAME POLYESTER 37X20	1	EA
5 2	533-57L-PA	LCD PCB ASS'Y	1	EA
3	251-224-8Z	PILOT LAMP 60MA 3& 14V	3	EA
3	252-311-8	LCD DISPLAY ISO06468P	1	EA
3	436-059-7Z	SW TACT TM115AP	5	EA
6 2	533-57M-A	MIC ASS'Y	1	EA
3	002-104-1Z	FILM RESISTOR 100K 1/ 8W 5% ST	1	EA
3	002-154-6Z	FILM RESISTOR 150K 1/ 8W 5% ST	1	EA
3	002-473-4Z	FILM RESISTOR 47K 1/ 8W 5% ST	1	EA
3	130-A17-6Y	CHIP CERAMIC 0.001UF GRM40 X7R102K 50V PT	1	EA
3	411-803-A	P.C.B MIC 16.9 X33.5 X1.6 XPC-94HB 1/0	1	EA
3	420-205-9W	MIC CONDENSER YCM9765-W-005	1	EA
3	420-340-7Y	CORD CURLED STHK-23063	1	EA
3	421-069-8	MIC CONNECTOR MIC-6PIN(P) SW-1561	1	EA
3	423-530-7	POWER CORD ASS'Y SHD-7302	1	EA
3	432-040-6	SW PUSH SPPH221AP011	1	EA
3	432-058-3Y	PUSH SWITCH SKPS-2210C	1	EA
3	436-059-7Z	SW TACT TM115AP	2	EA
3	600-718	(-)SECURING SCREW ABS M6X8(P:1)BLK	2	EA
3	621-098	(+)TAPPING SCREW(PH)T2.6X16-2S (+)PH NI-PLAT	4	EA
3	621-360	(+)TAPPING SCREW(FH)2.6X12-2S BLK	1	EA
3	623-663	(+)TAPPING SCREW(BH)3X10-2S NI-PLAT	2	EA
3	625-007	(+)TAPPING SCREW(TH)5X12-1S ZN-PLAT	3	EA
3	660-138	WASHER RUBB.&7X&25XT1.5 BLK	2	EA
3	664-320	WASHER(LOCK"B"TYPE) M3 NI-PLAT	2	EA
3	664-518	WASHER(LOCK"B"TYPE) M5 ZN-PLAT	3	EA
3	719-736	COVER UPPER(MIC) ABS94HB BLK	1	EA
3	719-737	COVER BOTTOM(MIC) ABS94HB BLK	1	EA
3	720-050	BRACKET(MIC MTG) SPC 60X35XT1	1	EA
3	723-661	BRACKET(SET) SPC T2 ZN-PLAT BLK	1	EA
3	730-024-B	HOLDER(MIC) PC BLK	1	EA
3	740-548	LEVER ABS 94HB BLK	1	EA
3	795-646-J	OVERLAY PVC T0.3	1	EA
3	826-419	KNOB CH ABS 94HB BLK	2	EA
3	826-420	KNOB PUSH ABS 94HB BLK	1	EA
3	870-036	WIRE CLAMP (CORD) NYLON	1	EA
3	892-890	HOLDER(MIC) &9.8X&11.4XT7 RUBB.BLK	1	EA
3	900-373	FELT &28XT0.3 FELT BLK	1	EA
3	921-010-E	POLYBAG P.E 100X100XT0.05	2	EA
3	921-020-E	POLYBAG P.E 100X200XT0.05	1	EA
7 2	533-57M-PA	MAIN PCB AUTO ASS'Y	1	EA
3	060-000-8Z	CHIP RESISTOR 0 1/10W 5% T 2012	2	EA
3	060-101-6Z	CHIP RESISTOR 100 1/10W 5% T 2012	7	EA
3	060-102-7Z	CHIP RESISTOR 1K 1/10W 5% T 2012	10	EA
3	060-103-8Z	CHIP RESISTOR 10K 1/10W 5% T 2012	20	EA
3	060-104-9Z	CHIP RESISTOR 100K 1/10W 5% T 2012	37	EA
3	060-105-0Z	CHIP RESISTOR 1M 1/10W 5% T 2012	2	EA
3	060-122-5Z	CHIP RESISTOR 1.2K 1/10W 5% T 2012	1	EA
3	060-123-6Z	CHIP RESISTOR 12K 1/10W 5% T 2012	2	EA
3	060-124-6Z	CHIP RESISTOR 120K 1/10W 5% T 2012	1	EA
3	060-151-1Z	CHIP RESISTOR 150 1/10W 5% T 2012	2	EA
3	060-152-2Z	CHIP RESISTOR 1.5K 1/10W 5% T 2012	3	EA
3	060-153-3Z	CHIP RESISTOR 15K 1/10W 5% T 2012	4	EA
3	060-154-4Z	CHIP RESISTOR 150K 1/10W 5% T 2012	2	EA
3	060-155-5Z	CHIP RESISTOR 1.5M 1/10W 5% T 2012	1	EA
3	060-181-8Z	CHIP RESISTOR 180 1/10W 5% T 2012	1	EA
3	060-183-0Z	CHIP RESISTOR 18K 1/10W 5% T 2012	2	EA
3	060-221-1Z	CHIP RESISTOR 220 1/10W 5% T 2012	4	EA
3	060-222-2Z	CHIP RESISTOR 2.2K 1/10W 5% T 2012	14	EA
3	060-223-3Z	CHIP RESISTOR 22K 1/10W 5% T 2012	4	EA
3	060-224-4Z	CHIP RESISTOR 220K 1/10W 5% T 2012	4	EA
3	060-225-5Z	CHIP RESISTOR 2.2M 1/10W 5% T 2012	1	EA
3	060-272-7Z	CHIP RESISTOR 2.7K 1/10W 5% T 2012	1	EA
3	060-273-8Z	CHIP RESISTOR 27K 1/10W 5% T 2012	2	EA
3	060-274-9Z	CHIP RESISTOR 270K 1/10W 5% T 2012	1	EA
3	060-332-8Z	CHIP RESISTOR 3.3K 1/10W 5% T 2012	1	EA
3	060-333-9Z	CHIP RESISTOR 33K 1/10W 5% T 2012	7	EA
3	060-334-0Z	CHIP RESISTOR 330K 1/10W 5% T 2012	1	EA
3	060-392-2Z	CHIP RESISTOR 3.9K 1/10W 5% T 2012	1	EA
3	060-393-3Z	CHIP RESISTOR 39K 1/10W 5% T 2012	2	EA
3	060-470-9Z	CHIP RESISTOR 47 1/10W 5% T 2012	4	EA
3	060-471-0Z	CHIP RESISTOR 470 1/10W 5% T 2012	6	EA

	3	060-472-1Z	CHIP RESISTOR 4.7K 1/10W 5% T 2012	10	EA
	3	060-473-2Z	CHIP RESISTOR 47K 1/10W 5% T 2012	15	EA
	3	060-474-3Z	CHIP RESISTOR 470K 1/10W 5% T 2012	4	EA
	3	060-479-8Z	CHIP RESISTOR 4.7 1/10W 5% T 2012	1	EA
	3	060-561-8Z	CHIP RESISTOR 560 1/10W 5% T 2012	1	EA
	3	060-562-9Z	CHIP RESISTOR 5.6K 1/10W 5% T 2012	5	EA
	3	060-563-0Z	CHIP RESISTOR 56K 1/10W 5% T 2012	3	EA
	3	060-681-3Z	CHIP RESISTOR 680 1/10W 5% T 2012	2	EA
	3	060-682-4Z	CHIP RESISTOR 6.8K 1/10W 5% T 2012	3	EA
	3	060-822-4Z	CHIP RESISTOR 8.2K 1/10W 5% T 2012	1	EA
	3	060-823-5Z	CHIP RESISTOR 82K 1/10W 5% T 2012	1	EA
	3	130-A13-2Y	CHIP CERAMIC 0.0012UF GRM40 X7R122K 50V PT	1	EA
	3	130-A17-6Y	CHIP CERAMIC 0.001UF GRM40 X7R102K 50V PT	10	EA
	3	130-170-0Y	CHIP CERAMIC 0.1UF GRM40 Y5V104Z 25V PT	15	EA
	3	130-172-2Y	CHIP CERAMIC 0.01UF GRM40 X7R103K 50V PT	35	EA
	3	130-239-0Y	CHIP CERAMIC 0.0022UF GRM40 X7R222K 50V PT	1	EA
	3	130-314-5Y	CHIP CERAMIC 0.033UF GRM40 X7R333K 50V PT	1	EA
	3	130-424-0Y	CHIP CERAMIC 0.047UF GRM40 X7R473K 50V PT	13	EA
	3	130-602-4Y	CHIP CERAMIC 0.0068UF GRM40 X7R682K 50V PT	1	EA
	3	130-606-8Y	CHIP CERAMIC 0.068UF GRM40 X7R683K 50V PT	2	EA
	3	131-027-0Y	CHIP CERAMIC 100PF GRM40 COG101J 50V PT	6	EA
	3	131-039-1Y	CHIP CERAMIC 10PF GRM40 COG100C 50V PT	1	EA
	3	131-107-9Y	CHIP CERAMIC 120PF GRM40 COG121J 50V PT	3	EA
	3	131-208-7Y	CHIP CERAMIC 12PF GRM40 COG120J 50V PT	1	EA
	3	131-511-0Y	CHIP CERAMIC 15PF GRM40 COG150J 50V PT	2	EA
	3	131-529-7Y	CHIP CERAMIC 150PF GRM40 COG151J 50V PT	2	EA
	3	131-816-6Y	CHIP CERAMIC 18PF GRM40 COG180J 50V PT	1	EA
	3	132-011-0Y	CHIP CERAMIC 2PF GRM40 COG020C 50V PT	1	EA
	3	132-012-1Y	CHIP CERAMIC 20PF GRM40 COG200J 50V PT	3	EA
	3	132-216-9Y	CHIP CERAMIC 22PF GRM40 COG220J 50V PT	2	EA
	3	132-220-2Y	CHIP CERAMIC 220PF GRM40 COG221J 50V PT	5	EA
	3	132-235-6Y	CHIP CERAMIC 0.022UF GRM40 X7R223K 50V PT	3	EA
	3	132-710-8Y	CHIP CERAMIC 270PF GRM40 COG271J 50V PT	1	EA
	3	132-714-2Y	CHIP CERAMIC 27PF GRM40 COG270J 50V PT	1	EA
	3	133-010-4Y	CHIP CERAMIC 30PF GRM40 COG300J 50V PT	1	EA
	3	133-339-2Y	CHIP CERAMIC 330PF GRM40 COG331J 50V PT	3	EA
	3	133-611-7Y	CHIP CERAMIC 36PF GRM40 COG360J 50V PT	1	EA
	3	133-932-7Y	CHIP CERAMIC 39PF GRM40 COG390J 50V PT	3	EA
	3	134-007-7Y	CHIP CERAMIC 4PF GRM40 COG040C 50V PT	1	EA
	3	134-719-7Y	CHIP CERAMIC 0.0047UF GRM40 X7R472K 50V PT	3	EA
	3	134-722-1Y	CHIP CERAMIC 47PF GRM40 COG470J 50V PT	3	EA
	3	134-761-4Y	CHIP CERAMIC. 470PF GRM40 COG471J 50V PT	1	EA
	3	135-613-9Y	CHIP CERAMIC 56PF GRM40 COG560J 50V PT	1	EA
	3	136-005-5Y	CHIP CERAMIC 6PF GRM40 COG060D 50V PT	3	EA
	3	136-811-6Y	CHIP CERAMIC 680PF GRM40 COG681J 50V PT	1	EA
	3	136-816-5Y	CHIP CERAMIC 68PF GRM40 COG680J 50V PT	2	EA
	3	138-004-4Y	CHIP CERAMIC 8PF GRM40 COG080D 50V PT	1	EA
	3	138-210-3Y	CHIP CERAMIC 82PF GRM40 COG820J 50V PT	3	EA
	3	202-085-9Z	TRANSISTOR KRC101SNA	9	EA
	3	202-096-9	BRT KRC110S NK	2	EA
	3	202-098-1	BRT KRC102S	2	EA
	3	202-099-2Z	TRANSISTOR KRC111SNM	2	EA
	3	202-106-5	TRANSISTOR KTA1504SY	9	EA
	3	202-112-0	TRANSISTOR KTC3875S(GR)	1	EA
	3	202-114-2	TRANSISTOR KTC3876ST1(Y)	11	EA
	3	202-129-6Z	TRANSISTOR KRC112ST1	1	EA
	3	202-153-7	TRANSISTOR KTC3880SY	8	EA
	3	202-183-4	FET KTK211GR	3	EA
	3	220-048-2	I.C FM.IF TK10487M	1	EA
	3	221-460-5	I.C PLL(DUAL) BU2630F	1	EA
	3	221-879-3	I.C CPU S3C8245XB7-TWR5	1	EA
	3	222-023-9A	I.C DETECTOR KIA7042F	1	EA
	3	222-027-3	I.C OP AMP KIA4558F	1	EA
	3	229-376-3A	I.C EEPROM AT93C66-10SI-2.7 (NXP-15K)	1	EA
	3	242-024-6	DIODE VARIVAP CHIP KDV251S	2	EA
	3	243-019-7Z	DIODE 1N4148	21	EA
	3	4A1-182-B	P.C.B ASS'Y 175 X210.9X1.6 XPC-94HB 1/0	1	EA
	4	401-161-B	P.C.B MAIN 152 X159.6X1.6 XPC-94HB 1/0	1	EA
	4	411-805-B	P.C.B LCD 114 X18.5 X1.6 XPC-94HB 1/0	1	EA
	4	411-806-B	P.C.B VOLUME 122 X29.8 X1.6 XPC-94HB 1/0	1	EA
	4	411-807-B	P.C.B ROTARY 18 X14 X1.6 XPC-94HB 1/0	1	EA
	4	411-808-B	P.C.B SQ 25 X19.5 X1.6 XPC-94HB 1/0	1	EA
8 2		533-57M-PM	MP MANUAL ASS'Y	1	EA

3	019-479-8X	METAL OXID RESISTOR 4.7 2W 5% ST BULK	2	EA
3	030-100-6Z	FILM RESISTOR 10 1/ 2W 5% ST MINI	1	EA
3	030-229-0Z	FILM RESISTOR 2.2 1/ 2W 5% ST MINI	2	EA
3	030-472-2Z	FILM RESISTOR 4.7K 1/ 2W 5% ST MINI	1	EA
3	030-479-3Z	FILM RESISTOR 4.7 1/ 2W 5% ST MINI	1	EA
3	061-110-9	RESISTOR SEMIFIXED 100KB PC805M H 8DIA	1	EA
3	061-205-2	RESISTOR SEMIFIXED 2KB PC805M H 8DIA	2	EA
3	061-206-3	RESISTOR SEMIFIXED 20KB PC805M H 8DIA	1	EA
3	061-507-7	RESISTOR SEMIFIXED 5KB PC805M H 8DIA	1	EA
3	061-508-8	RESISTOR SEMIFIXED 50KB PC805M H 8DIA	1	EA
3	098-201-2	THERMISTOR DISK 200 OHM 15%:KC5B120L	2	EA
3	100-101-9Y	ELECT CAPACITOR 0.1UF 50V 20% 5X11	2	EA
3	100-405-4X	ELECT CAPACITOR 0.47UF 50V 20% 5X11	1	EA
3	101-006-2Y	ELECT CAPACITOR 1UF 50V 20% 5X11 2.5PT	5	EA
3	101-043-5Z	ELECT CAPACITOR 10UF 16V SRA(M):4X7 2.5PT	12	EA
3	101-117-9	ELECT CAPACITOR 1000UF 16V 20% 10X16	3	EA
3	101-122-3	ELECT CAPACITOR 100UF 16V 20% 6.3X11	3	EA
3	102-241-2Y	ELECT CAPACITOR 2.2UF 50V 20% 4X7	1	EA
3	102-301-3	ELECT CAPACITOR 220UF 35V 20% 8X12	3	EA
3	103-313-9Y	ELECT CAPACITOR 33UF 16V 20% 5X11	1	EA
3	104-771-4X	ELECT CAPACITOR 47UF 16V 20% 5X11	4	EA
3	104-808-5X	ELECT CAPACITORS 4.7UF 16V 20% 3X5	1	EA
3	104-813-9X	ELECT CAPACITOR 470UF 16V 20% 8X12	1	EA
3	130-101-8	DISK CERAMIC 0.001UF F 102Z 50V	1	EA
3	130-227-9X	DISK CERAMIC 0.022UF Y5U223M 50V	1	EA
3	131-510-9X	DISK CERAMIC 150PF NPO K% 50V	1	EA
3	133-311-0	DISK CERAMIC 330PF NPO331K 50V	1	EA
3	140-201-8	DIP TANTALUM 0.22UF ECSF1VE224M 16V	1	EA
3	141-002-0	DIP TANTALUM 1UF TAM1H010DJCB 50V	1	EA
3	141-012-9X	DIP TANTALUM 10UF TBM1C106GSCB10MFD 16\	4	EA
3	143-301-0X	DIP TANTALUM 3.3UF TBM1C335CSCB3.3MFD 16\	2	EA
3	172-015-6W	DIP TRIMMER 20PF CVN620	1	EA
3	200-178-0Y	TRANSISTOR ST9015B(EBC-M)	1	EA
3	200-206-2	TRANSISTOR MPSH10 (TO-92)	1	EA
3	202-046-4Z	TRANSISTOR ST9014B(EBC-M)	1	EA
3	204-016-7	TRANSISTOR 2SC2314(E)	1	EA
3	241-004-3X	DIODE ZENER 1N5237BST	1	EA
3	241-091-1Z	DIODE ZENER 4V7HCCST	1	EA
3	241-263-0	DIODE ZENER 1N5232BST	1	EA
3	244-001-5W	DIODE GE 1N60P	3	EA
3	245-008-7X	DIODE RECTIFIER 1N5404	1	EA
3	245-015-3X	DIODE RECTIFIER 1N4004	1	EA
3	260-485-5V	CRYSTAL HC49U 10.240M -30 30PM 32P FUND	1	EA
3	262-043-9Y	CRYSTAL(HC-49U) 4.5MHZ -30 30PM 16P FUND	1	EA
3	270-007-0X	FILTER CERAMIC LT455HT	1	EA
3	270-131-8W	RESONATOR CERAMIC ZTA4.0MG	1	EA
3	271-030-5Z	FILTER CRYSTAL HC49/T (10.695M)	1	EA
3	300-024-5Y	TRANSFORMER EI-28 (OPT)	1	EA
3	300-136-3W	TRANSFORMER LE119-H019	1	EA
3	310-022-6Z	COIL RF CHOKE 10UF CR5K-869538	1	EA
3	310-291-2Z	COIL AXIAL 6.8UH:TCEC-6R8K	1	EA
3	310-296-7Z	COIL SPRING 6X0.8X5.5T:R	1	EA
3	310-297-8Z	COIL SPRING 2.5X0.8X7T:R	1	EA
3	310-301-8	COIL CHOKE 6UH BOBBIN CORE	1	EA
3	310-347-0Z	COIL SPRING 5.2X0.7X7T:R	1	EA
3	310-381-0	COIL AXIAL 1MH:LAL03TB102K	1	EA
3	310-407-1	COIL SPRING 5X0.6X13.5T:R	1	EA
3	310-621-7Z	COIL AXIAL 1.5UH:CESS-1R5K	1	EA
3	310-751-1	COIL SPRING 4X0.5X7T:R	1	EA
3	310-811-2	COIL SPRING 3.4X0.55X8.5T:R	1	EA
3	320-276-2Y	COIL IFT DET R4251-AHK7-854462	1	EA
3	320-318-7Z	COIL IFT Z73C-359	2	EA
3	320-380-2Z	COIL IFT 27MHZ RX ANT	1	EA
3	320-576-3X	COIL IFT 10.7MHZ LKSZ73C0-X000363-0	1	EA
3	320-577-4Z	CIOL IFT 37MHZ LKSZ73CO-X000297-0	1	EA
3	320-579-6Z	CIOL IFT 15MHZ LKSZ73CO-X000295-0	1	EA
3	320-580-6Z	COIL IFT Z735-332	1	EA
3	320-584-0Z	COIL IFT R4251-AHK7-854461	1	EA
3	320-585-1Z	COIL IFT 27MHZ Z073I-1	1	EA
3	321-095-2Z	CIOL IFT 27MHZ LKSZ73CO-X000296-0	1	EA
3	509-110	6.5T SPRING COIL ASS6.5T3.4X.55:M9D3.7X6	1	EA
4	310-809-1	COIL SPRING 3.4X0.55X6.5T:R	1	EA
4	321-053-2	CORE 1108-KA-058 M9DTH3.7X6	1	EA

3	594-083	CB BPF MODULE	1	EA
4	131-027-0Y	CHIP CERAMIC 100PF GRM40 COG101J 50V PT	2	EA
4	131-529-7Y	CHIP CERAMIC 150PF GRM40 COG151J 50V PT	3	EA
4	133-306-2Y	CHIP CERAMIC 33PF GRM40 COG330J 50V PT	1	EA
4	134-722-1Y	CHIP CERAMIC 47PF GRM40 COG470J 50V PT	3	EA
4	310-621-7Z	COIL AXIAL 1.5UH:CESS-1R5K	1	EA
4	310-823-3	CORE SPRING ASS'Y 5.5TX0.45XM5E(R)X2.3 0.17UH	3	EA
4	411-985	P.C.B SUB 25.5 X9 X1.2 FR4 1/1	1	EA
3	771-525	SHIELD HOUSHING SPTE T0.3	1	EA
3	771-530	SHIELD PLATE SPTE T0.3	2	EA
3	772-238	SHIELD HOUSING SPTE T0.3	1	EA
3	772-274-AA	SHIELD PLATE SPTE T0.3	1	EA
3	772-665	SHIELD PLATE SPTE T0.3	1	EA
3	905-685-A	INSULATION PLATE INSULATION PAPER T0.25	2	EA
3	906-591-A	INSULATION PLATE INSULAT.PAT T0.25	1	EA
9 2	533-57P-A	PACKING ASS'Y	1	EA
3	91C-002	PAD (TRC-439) SW1S 268X21	2	EA
3	91C-650-B	BOX INNER SW1S 239(W)X269(D)X68(H)	1	EA
3	91C-727	PAD DW1E 45X140 T=7.5	1	EA
3	91C-728	TRAY BOX SW1S T=2.0	1	EA
3	91D-295	BOX OUT DW1E 425(W)X272(D)X242(H)	0,167	EA
3	922-535-E	POLYBAG P.E 250X350XT0.05	1	EA
3	937-102-B	MANUAL OWNER'S ART/WOODFREEPAPER 148X21	1	EA
3	95A-768	SERIAL LABEL ART PAPER 45X20	6	EA
10 2	533-57W-FB	WIRE FRONT BODY ASSY	1	EA
3	427-001-6	WIRE 1007 AWG 24(1/0.51) BLK	0,08	ME
3	427-005-0	WIRE 1007 AWG 24 (1/0.51) YEL	0,32	ME
3	427-007-2	WIRE 1007 AWG 24 (1/0.51) BLU	0,16	ME
3	427-008-3	WIRE 1007 AWG 24 (1/0.51) VIO	0,19	ME
3	427-009-4	WIRE 1007 AWG 24(1/0.51) GRY	0,15	ME
3	427-009-4	WIRE 1007 AWG 24(1/0.51) GRY	0,06	ME
3	427-010-4	WIRE 1007 AWG 24(1/0.51) WHT	0,04	ME
11 2	533-57W-MA	WIRE MIC ASS'Y	1	EA
3	427-023-6	WIRE 1007 AWG 24(11/0.16) RED	0,06	ME
3	427-025-8	WIRE 1007 AWG 24(11/0.16) YEL	0,06	ME
3	427-026-9	WIRE 1007 AWG 24 (11/0.16) GRN	0,08	ME
12 2	533-57W-MP	WIRE MAIN PCB ASS'Y	1	EA
3	427-001-6	WIRE 1007 AWG 24(1/0.51) BLK	0,09	ME
3	427-002-7	WIRE 1007 AWG 24 (1/0/51) BRN	0,09	ME
3	427-004-9	WIRE 1007 AWG 24 (1/0.51) ORG	0,13	ME
3	427-005-0	WIRE 1007 AWG 24 (1/0.51) YEL	0,09	ME
3	427-045-6	WIRE 1007 AWG 26(7/0.16) YEL	0,19	ME
3	427-046-7	WIRE 1007 AWG 26(7/0.16) GRN	0,19	ME
3	427-269-2	WIRE 1015 AWG 20(10/0.26) RED	0,08	ME
3	427-270-2	WIRE 1015 AWG 20(10/0.26) BLK	0,08	ME
13 2	533-57S-MA	SUB MATERIAL ASS'Y	1	EA
3	427-174-9	WIRE STRIP 0.5 DIA	20	GR
3	960-274	TUBE UL/CSA KEIT-30 AWG 12 (2&) CLEAR VINYL	0,05	ME
3	964-140	TUBE GLASS WOOL 6&	0,3	ME
3	964-159	TUBE GLASS WOOL 0.8&	0,4	ME
3	965-002	TAPE SCOTCH 10M/M (0.010X25M)	0,1	ME
3	965-020	TAPE SCOTCH 15M/M (0.015X20M)	0,25	ME
3	965-039	TAPE PACKING OPP (0.05X50M)	0,5	ME
3	965-048	TAPE PACKING O.P.P.(0.05X25M) IVORY	0,15	ME
3	965-057	TAPE MASKING 4MM (0.004X50M)	0,15	ME
3	966-007	SOLDER BAR 63:37	20	GR
3	966-016	SOLDER ROSIN CO.WIRE60:40 0.04"-0.05"	13	GR
3	966-025	FLUX ROSIN	8	GR
3	966-034	THINNER FOR FLUX	8	GR
3	966-061	SILICON GREASE YG-6111 OR XG-6111	0,02	GR
3	967-002	STAVILIZER MATERIAL	10	GR
3	967-011	BOND #201	1	KG
3	967-039	BOND #609 #609	5	GR
3	967-057	WAX MICRO	5	GR
3	967-066	WAX POLY 3.6L	0,08	GR
3	967-118	ANTISTATIC OIL	0,5	GR
3	967-163	TIE WIRE VINYL 1.2 DIA	0,4	ME